COMMODORE USERS

Ahoy!

MORE PROGRAMS THAN EVER BEFORE!

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Ahoy!

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DEPARTMENTS

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FEATURES

*Includes programs: *Mansion Display Setup* and *Mansion Game* for the C-64

PROGRAMS

Cover illustration by James Regan
Photos/art inside screens by Morton Kevelson, JoAnn Case

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Michael Schneider

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David Allikas

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Advertising Representative
JE Publishers' Representative
6855 Santa Monica Blvd., Suite 200
Los Angeles, CA 90038
(213)467-2266
Boston (617)437-7628
Dallas (214)660-2253
New York (212)724-7767
Chicago (312)445-2489
Denver (303)595-4331
San Francisco (415)864-3252

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VIEW FROM THE BRIDGE

Is too much of a good thing not so good? We weren't sure, but we took a chance and packed this issue full of the two items that readers across the US and Canada have been writing and phoning to request more of: the high-quality utility programs and hardware analyses that *Ahoy!* has come to be known for. We'll stop blowing our own horns for a minute and let this issue's lineup of utility and entertainment programs speak for itself:

• A sure cure for the cobwebs that may have been gathering on your function keys since you bought your C-64 is provided by Dex T. Peterson's *Programmable Functions*. That enigmatic quartet may soon take on undreamed of value in your programming! (Turn to page 23.)

• Stream-of-consciousness programmers who don't like interrupting their creative flow to place line numbers at the start of each program line—and just plain lazy folks—Tim Midkiff's *Automatic Line Numbers* is the stroke-saver you've been praying for. (Turn to page 27.)

• If *Old Routine* sounds like a drag to you, pass it up ...*until* the next time you accidentally NEW a program in memory. Now *that's* a *drag!* And Robert Alonso's short ML program is the cure. (Turn to page 25.)

• You can put all these newfound programming powers to practical use as Brian Dobbs' *Home Budget* allows you to keep an eye (and a lid) on your family's monthly expenses. (Turn to page 43.)

• And you can put those programming powers to totally impractical use with Marilyn Sallee's *Numerology* for the VIC and 64. Forget the lampshade and try *this* at your next party! (Turn to page 45.)

• Here in New York, a home electronics outfit called Crazy Eddie runs Christmas sales all year round. With that precedent cited, we offer no apologies for presenting *Elfred*, a C-64 game starring Santa Claus, in March. (If you insist on an explanation, David and Janet Arnold's children's game crossed our desks too late to publish at Christmas, and we loved it too much to hold till next December.) (Turn to page 59.)

• If you missed the debut of *Flankspeed* last issue, it's re-presented here. You'll need this ML entry program to utilize *Old Routine* and all future *Ahoy!* machine language programs. (Turn to page 64.)

• But most incredible of all is Orson Scott Card's masterwork: a multiscreen mystery game presented as part of this month's edition of *Creating Your Own Games on the VIC and 64: A Gameboard Bigger than the Screen.* There's one catch: you'll have to read the article and learn how to finish programming the game yourself! (Turn to page 14.)

As we draw an exhausted breath, we can almost hear your reaction to our description of the most program-packed issue in *Ahoy!* history: "What about the hardware?" This issue features not one, but two of Morton Kevelson's popular vivisections.

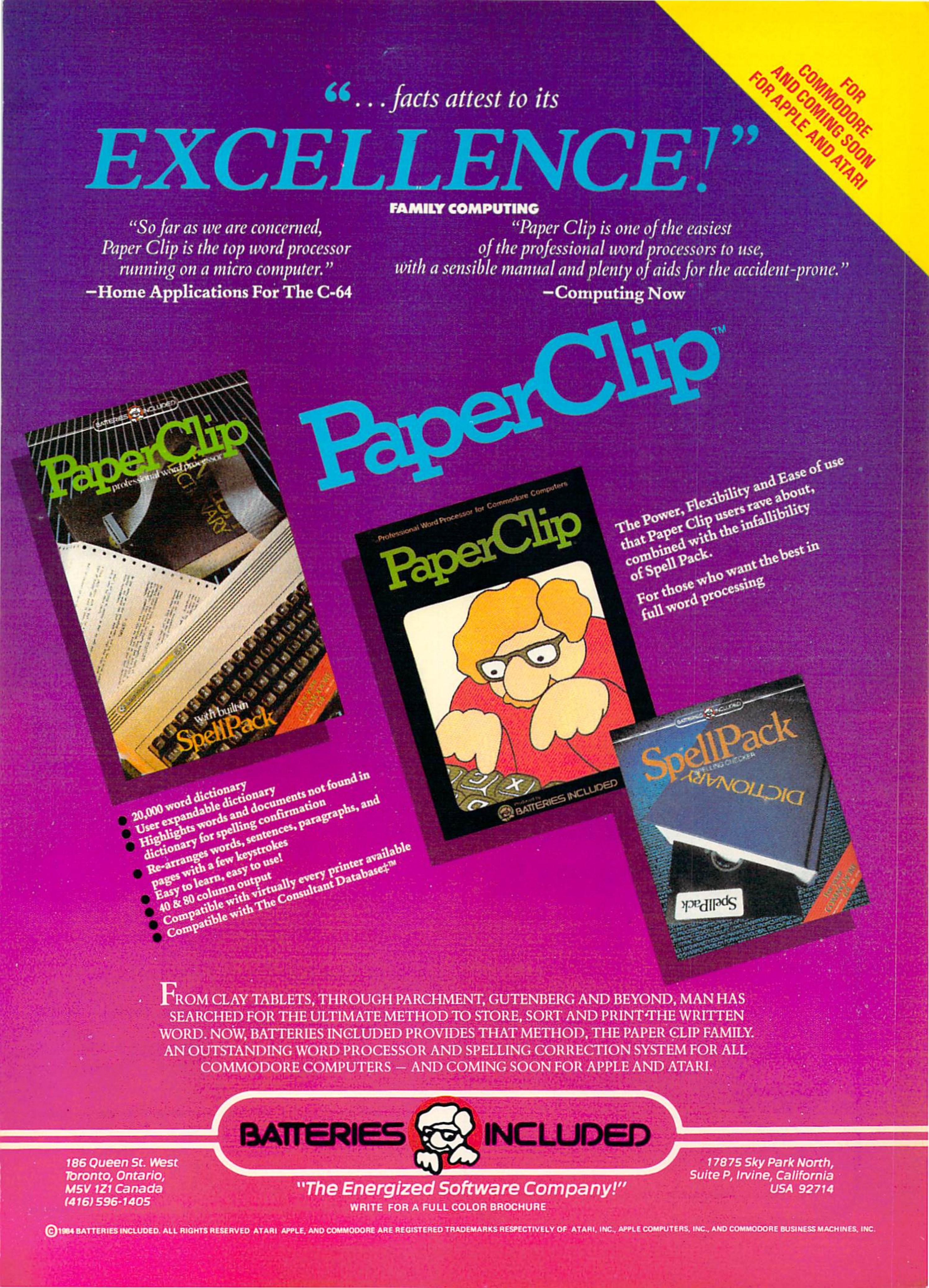
• For openers—and especially non-openers—Morton the K winds up his '85 update on *Printer Interfaces* with a look inside the Okimate 10 with Plus 'n Print, Xetec GPI and SPI, Cardco Card?/ + B, PS, and + G, and the Tymac Connection. (Turn to page 101.)

And at last, the answer to the question so many of you have asked us: do I want a Plus/4? Morton provides the definitive look at Commodore's applications computer in *What's Inside the Plus/4?* (Turn to page 29.)

This issue also finds Dale Rupert in an interrogative mood as he asks in his best German accent: *What's DOS?* This month's *Rupert Report* provides quite a different approach to the Commodore disk operating system than that presented by Donald H. Graham in our January '85 issue. (Turn to page 53.)

As excited as we are about this issue—containing more programs and total program pages than ever before—it's next issue's lineup that's really got us grinning. You'll see notices of some of the planned programs and features in various places around the magazine. Wish we could tell you more...but we're out of room! See for yourself next month.

—David Allikas


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–Home Applications For The C-64
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FLOTSAM

We'd love to hear from you. Address your correspondence to Flotsam, *c/o* Ahoy!, *Ion International Inc., 45 West 34th Street—Suite 407, New York, NY 10001.*

Anton W. Dek of Gravenhage, Netherlands has pointed out that a statement in the August, 1984 *Rupert Report, Computational Wizardry*, was in error.

The *Time* magazine article (February 13, 1984, p. 47) which I used as a source for this information shows that "2 ^ 251 − 1" is the 69-digit number called Z$ in my article, but Mr. Dek has clearly shown that that is not correct. In fact, "2 ^ 251 − 1" is a 76-digit number. The factors of Z$ in my article are correct as shown. The only mystery is, what is the significance of Z$?

Any reader's help would be appreciated.

—Dale Rupert

I'm writing to you for more information on the new disk drive from Indus. Are you going to test the drive and give your opinion of it? I'd like to purchase one, but before I do, I'd like to know what *Ahoy!* thinks.

—Joe Colianni
Ellwood City, PA

You'll be happy to know, Joe, that Morton Kevelson will not only be reviewing the Indus drive, but taking readers on the usual Fantastic Voyage through it and several other 1541 replacements and enhancements, in the April issue of Ahoy!

Concerning the *Midprint* program that appeared in the January '85 issue of *Ahoy!*, the modification listed to make the program suitable for VIC use will not in fact do the trick.

Here are the changes needed to make the program run on the VIC 20:

```
108 IF C$="L" THEN POKE 36869,242:GOTO 1
15
109 IF C$="U" THEN POKE 36869,240:GOTO 1
15
300 IF PEEK(36869)=242 THEN M=7
```

In line 330 you need to change the 20 to 11; in line 150, change the 40 to a 22.

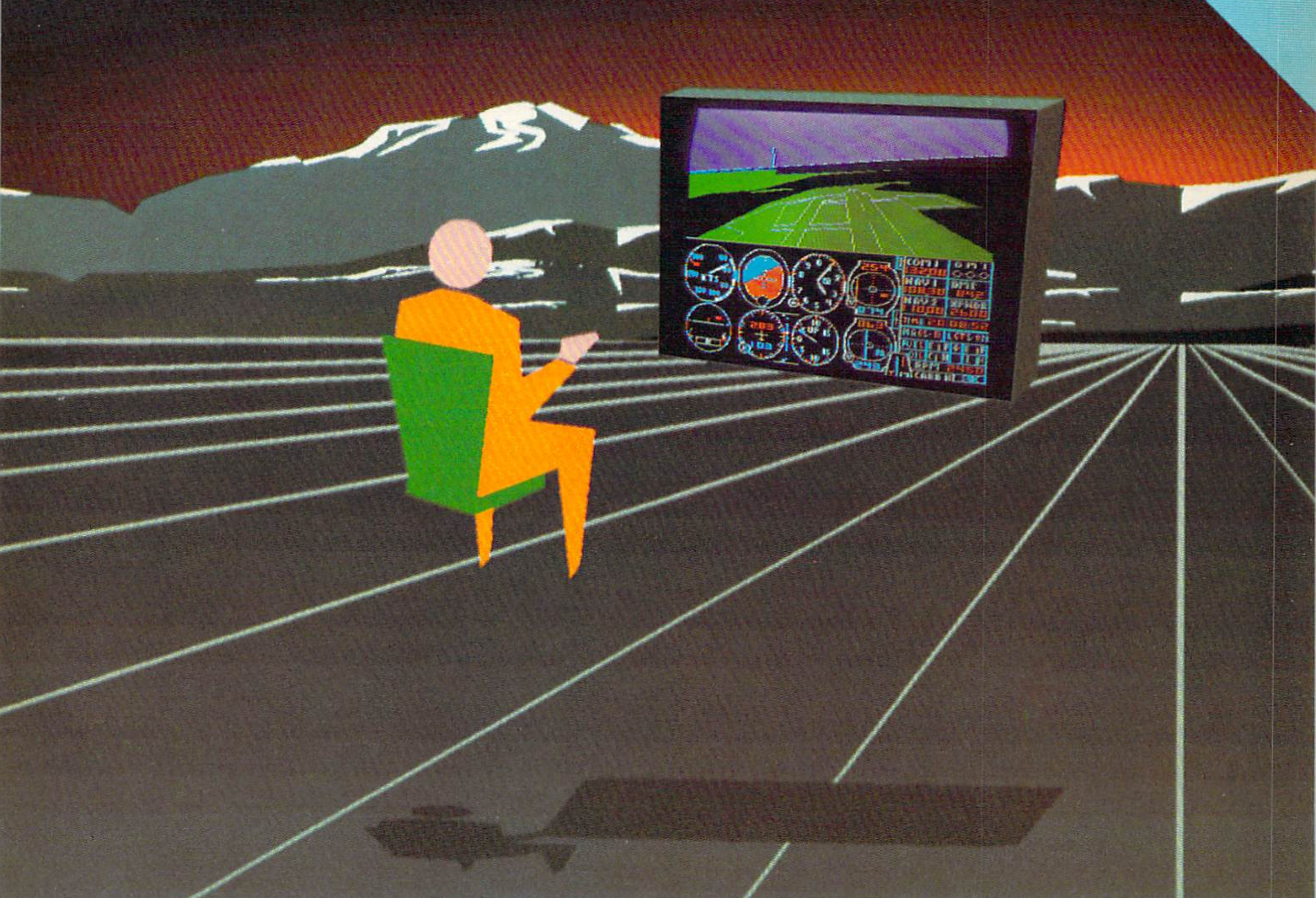
I hope you'll be able to use this information to help other VIC 20 owners.

—Earl Harvey
Laramie, WY

A special note of apology to Ross M. Horowitz, whom we failed to credit as the photographer of the artwork appearing on the title spread of Telelink 64 (pages 14 and 15 in the February '85 *Ahoy!*).

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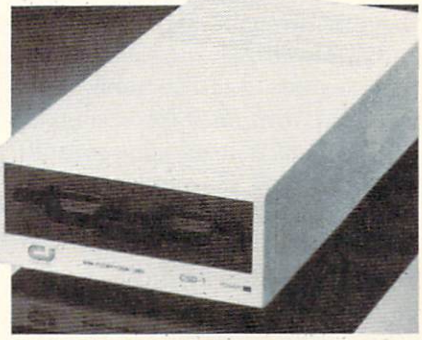
ROBOT PLOTTER • GRAPHICS CONTEST • MUSIC VIDEO MAKERS • TAX PREPARATION PROGRAMS • LASERDISK STORAGE • CARDCO MODEM, DISK DRIVE, SPREADSHEET • DISK-BASED MAGAZINE • GAMES FROM IMAGIC, SSI, ACTIVISION • EDUCATIONAL RELEASES • GRAPHICS PROGRAMS

CARDCO DISK DRIVE

Cardco's CSD-1 (short for Commodore Compatible Serial Disk Drive) will correct four fundamental flaws of the 1541: it will be more compact and slightly faster, and offer better heat dissipation and reliability. Designed to be as compatible as legally possible with Commodore's drive, the CSD-1 will obey all standard Commodore DOS commands.

Limited quantities of the unit will be available in the first quarter of 1985. Retail price will be $299.95.

Cardco Inc., 300 S. Topeka, Wichita, KS 67202 (phone: 316-267-3807).



CSD-1: faster and smaller than 1541.
READER SERVICE NO. 276

LASERDISK STORAGE

Floppy disk drives of all varieties have taken one step closer to obsolescence with Sony's announcement of the first laserdisk computer storage unit. The CDU-1 CD ROM Drive Unit uses the same technology found in home stereo CD players to pack 540M bytes—more than 500 times the capacity of a conventional floppy—onto a single 4.72 inch disk. Data may be read off the disk at a speed of 150K per second.

The only way to place your own information on the read-only disks is to mail the information on ½" tapes to Sony, who will punch out disks in quantity. Therefore the drive—while compatible with the Commodore and other home computers—is at this point practical only for industrial and institutional use. But the advent of the fully functional laserdisk storage unit looms closer than ever.

Sony Corporation of America, Corporate Communications Dept., Sony Drive, Park Ridge, NJ 07656 (phone: 201-930-6432).



Sony CDU-1 packs 540M—that's M, son.
READER SERVICE NO. 277

NEW GAME RELEASES

New and forthcoming releases from Activision, all for the 64:

Rock and Bolt treats you to rock music and riveting graphics as you connect free-floating steppingstones into a path. Price: $31.95.

Web Dimension tells the story of man's evolution through highly unusual graphics and music. No price yet for this, or for Activision's two newest: *Master of the Lamp* (a *Zenji*-type game) and *The Great American Cross Country Race.*

Activision, Inc., 2350 Bayshore Frontage Road, Mountain View, CA 94043 (phone: 415-960-0410).

As the *Gemstone Warrior,* you must develop strategies in order to score treasure points and slay a hoard of monsters en route to locating the gemstone in a network of underground roons. On C-64 disk; $39.95.

Strategic Simulations Inc., 883 Stierlin Road, Bldg. A-200, Mountain View, CA 94043-1983 (phone: 415-964-1353).

Miner 2049er II puts Bounty Bob back in the midst of ten screens full of ricocheting ore lumps, time warp transporters, and other hazards common to radioactive mines. For the 64; $35.00.

MicroLab, 2699 Skokie Valley Road, Highland Park, IL 60035 (phone: 312-433-7550).

Joining the sequels bandwagon is Access with *Beach-Head II (The Dictator Strikes Back)*, pitting the allied forces against the despot who escaped the destruction of his fortress and is now holed up in a tropical forest. For the 64; $39.95.

Access Software Inc., 925 East 900 South, Salt Lake City, UT 84105 (phone: 801-532-1134).

Wait, one more: *The Serpent's Star,* followup adventure to *Mask of the Sun,* thrusts Mac Steele into dangerous Tibetan wilderness in search of a $25 million jewel. For the C-64; $39.95.

Broderbund Software, 17 Paul Drive, San Rafael, CA 94903-2101 (phone: 415-479-1170).

An octet of C-64 releases and adaptations from Imagic:

Tournament Tennis serves up 3D graphics and an overhead view of the court. Price: $34.95.

Macbeth and *The Time Machine*, two entries in Imagic's Time Travelers series, provide interactive adven-

tures in the world of the two literary works. Suggested retail is $34.95 each.

VIC owners saw Imagic's most famous arcade action games adapted for their system months ago (see the May *Scuttlebutt*); now 64 owners get their chance, at a price worth the wait: $19.95 each. Available for the first time are *Chopper Hunt* (blast through tons of earth covering priceless objects), *Demon Attack* (destroy diving demons with laser cannon), *Dragonfire* (cross drawbridge against dragons' fireballs and archers' arrows), *Moonsweeper* (dodge meteors and asteroids to rescue trapped miners), and *Nova Blast* (protect underwater outposts from alien assault).

Imagic, 981 University Avenue, Los Gatos, CA 95030 (phone: 408-399-2200).

Mindscape has established a clue hotline for gamers who find themselves stumped by *Indiana Jones in the Lost Kingdom* (see last month's *Scuttlebutt*, and next month's review). Touch-tone phone owners can call 312-480-5010 24 hours a day, 365 days a year; callers with rotary phones must call between 9 a.m. and 4 p.m., central time.

Mindscape Inc., 3444 Dundee Road, Northbrook, IL 60062 (phone: 312-480-7667).

QuestBusters, a monthly newsletter on adventure and role-playing games, offers readers the opportunity to run free ads for trading clues and games. The winner of each month's contest receives a new adventure game. Subscription is $15.00; sample copy $2.00.

The Addams Expedition, 202 Elgin Court, Wayne, PA 19087 (phone: 215-647-0552).

Synapse has announced the first two entries in its Electronic Novels series: *Mindwheel* (a journey into the minds of four deceased people of extraordinary power) and *Essex* (the story of an intergalactic search and rescue mission). Planned novels include *Brimstone* (medieval adventure), *Breakers* (sci-fi/fantasy), and *Ronin* (samurai epic). For the 64; $39.95 each.

Synapse Software, 5221 Central Avenue, Richmond, CA 94804 (phone: 415-527-7751).

Four new C-64 releases from Swedish-based Handic Software:

Osiac requires you to destroy blockades on a trade route to the Orion empire. Price: $19.95.

Stellar Conflict offers, in addition to the standard shoot-'em-up fare, the opportunity to design your own alien landscapes. Price is $49.95.

Space Trap is named after the maze of tunnels on the planet Morgon from which you must escape. Price is $19.95.

Along with the five adventure games and one arcade game included on its *Eureka!* disk, Handic offers—25,000 pounds. That's what the company proposes to pay the first player to solve the complete adventure and call the secret phone number in England which will be revealed by the solution.

Handic Software, Inc., 520 Fellowship Road, Suite B206, Mt. Laurel, NJ 08054 (phone: 609-866-1001).

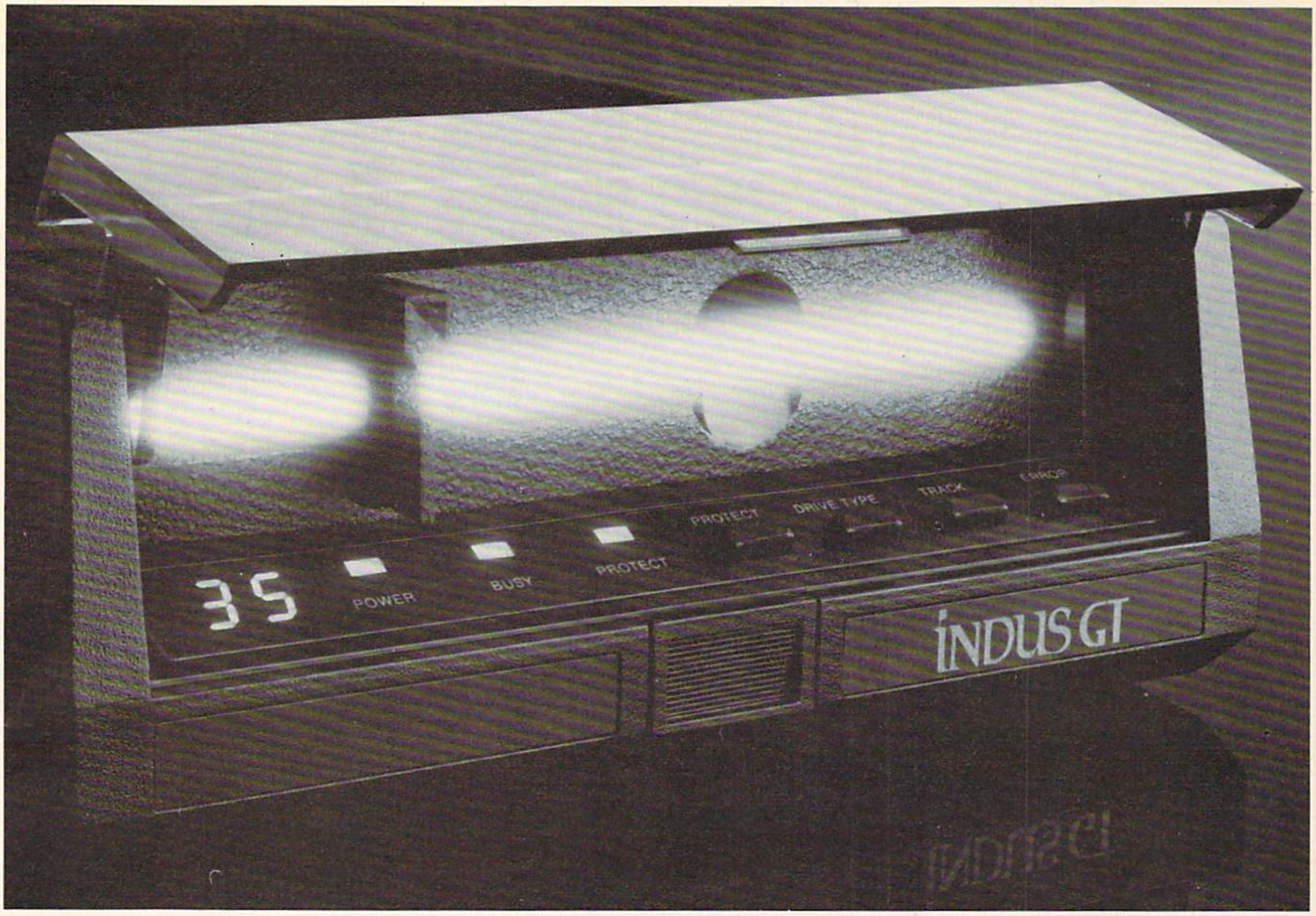
GRAPHICS CONTEST

Activision is dangling a total of $10,000 in cash and prizes before potential entrants in its *Designer's Pencil* contest. Participants must submit a design and/or music program created with the *Designer's Pencil* graphics software containing either 30 or fewer commands (Short Program Category) or an unlimited number of commands (Open Category). The 20 prizes (four grand prizes of $1,000, eight second prizes of $500, and eight third prizes of an Okidata printer) will be further divided between contestants who are 16 or older and 15 or younger as of April 30, 1985 (the deadline for submissions).

Specific guidelines are packaged with each copy of *Designer's Pencil;* for further information contact Activision, Box #7286, Mountain View, CA 94042 (phone: 415-960-0410).

SPREADSHEET DATA

The *Calc Now!/64* spreadsheet features 39K of free memory for data, 64 column by 254 row capacity, onscreen help windows, individually variable column widths, horizontal or vertical windowing, built-in scratch pad calculator, disk



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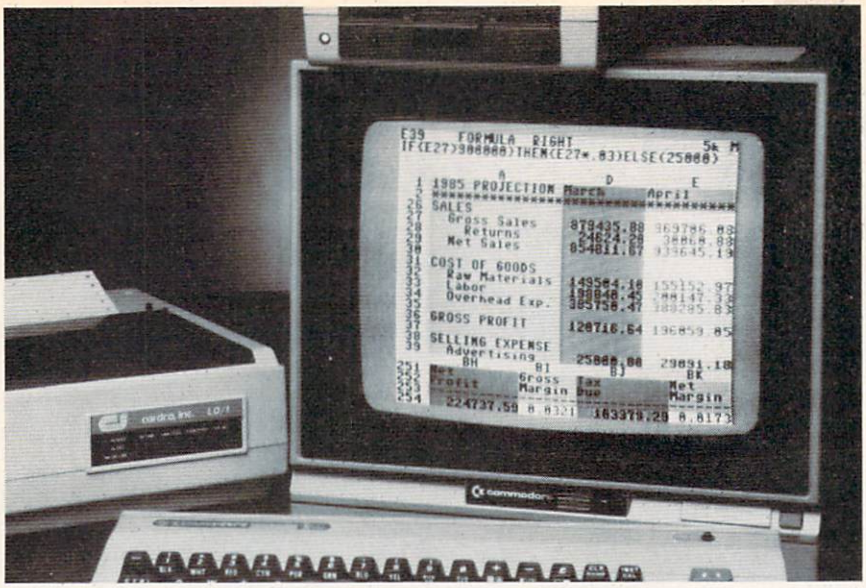
So, you know what you really get if you cross a Commodore 64 with a Ferrari?

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INDUS™

Reader Service No. 260



Calc Now! *has 39K of memory for data and 64 column by 254 row capacity.*
READER SERVICE NO. 272

functions, and column/row insertion and deletion. The program allows you to print an entire grid, any portion of a grid, or raw cell data. Retail price is $39.95. (And there's no urgency, really. Calc whenever it's convenient for you.)

Cardco, Inc., 300 S. Topeka, Wichita, KS 67202 (phone: 316-267-6525).

64K GOLD

The *Gold Disk* is a monthly program potpourri consisting of feature and home finance programs with accompanying articles, games, educational programs, regular graphics, music, and programming features, puzzles, and reviews.

A six-month subscription is $54.95 (US) or $70.00 (Canada) plus $6.00 shipping; a 12-month subscription, $99.95 (US) or $127.00 (Canada) plus $12.00 shipping. (Orders outside North America, add $3.00 per issue; Ontario residents add 7% sales tax.)

Gold Disk Inc., 2179 Dunwin Dr. #6, Mississauga, Ontario L5L 1X3 Canada (phone: 416-828-0913).

NEW INTERFACE

The Uniprint parallel printer interface for the C-64 and VIC 20 does its thing without dip switches, substituting software control through secondary addresses. It will allow most dot matrix printers to emulate the 1525, as well as work with daisy wheel printers. Price: $99.00.

Giga International Corp., 312A Auburn Street, San Rafael, CA 94901 (phone: 415-258-0901).

DRAW, PARDNER

Inkwell Systems has provided a partial response to the *Graphics Challenge* issued by Morton Kevelson in our October issue (page 4). *Flexidraw 4.0,* the latest update of the light pen graphics package covered in our November issue, is the first program that allows the user to link screens vertically and horizontally by displaying the left and right or top and bottom halves of two screens. Built-in printer utilities permit the dumping of the screens side by side.

Other enhancements include custom fonts, more than 500 pattern fills, and on oops feature for "fill spills." For the C-64; $149.95.

Inkwell Systems, P.O. Box 85152, MB290, San Diego, CA 92138.

EDUCATIONAL SOFTWARE

Several educational releases from Imagic, longtime masters of video/computer entertainment, each for the C-64, each $34.95.

In *Crime and Punishment,* players take the role of judge in criminal trials, examining evidence, testimony, and details of crimes, analyzing such factors as defendants' arrest and conviction records, and determining sentences for a variety of crimes.

Speak and Seek utilizes a 200+ word vocabulary and speech synthesis capability to teach two to seven year olds the alphabet.

Injured Engine depicts and explains the internal workings of a typical car engine, with detailed screens of the fuel, exhaust, combustion, electrical, cooling, and oil systems, and onscreen tutorials explaining their workings and interrelations.

Imagic, 981 University Avenue, Los Gatos, CA 95030 (phone: 408-399-2200).

Six ChallengeWare releases for the C-64 from Orbyte Software *Math Logic I* (word problems and greater than, less than, and equal to), *Early Numbers* (basic addition and subtraction enhanced by "motivational graphics"), and French, Italian, Spanish, and Latin tutorials, each covering nouns, verbs, and general terminology. All on disk; $29.95 each.

Orbyte Software, P.O. Box 948, Waterbury, CT 06720 (phone: in CT 203-621-9361; rest of USA 1-800-253-2600).

Children can practice word recognition and spelling while moving the title character of *Boppie's Great Word Chase* around a network of ladders and obstacles, gathering letters and avoiding deadly "snappers." The C-64 program contains 256 built-in words on eight levels. Retail price is $29.95; backup diskettes $15.00.

DLM Inc., One DLM Park, Allen, TX 75002 (phone: in TX 800-442-4711; rest of USA 800-527-4747).

Mark the Monkey will guide children in grades 1-6 through two new C-64 programs: *Monkeynews* (reading and comprehension, incorporating multiple choice quizzes) and *Monkeybuilder* (spelling and vocabulary, grouping 256 wordsets into 17 different word skill areas). Each on disk; $24.95.

Artworx Software, 150 North Main Street, Fairport, NY 14450 (phone: 716-425-2833 or 800-828-6573).

Two Muppet-based C-64 pro-

Continued on page 60

PlayNET announces 19 exciting ways to bring people together.

Now there's a Home Computer Network that lets you communicate with all kinds of people—all over the country! Make new friends, play exciting games, barter—shop—trade, all from the comfort of your home.

The network operates 6PM–7AM every weeknight, and 24 hours on Saturday, Sunday and Holidays. All you need to access PlayNET™ is a COMMODORE 64,* DISK DRIVE and MODEM.

1 TALK.
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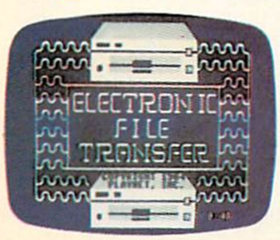


2 ELECTRONIC MAIL.
You can *send private messages* to people on the system, and the message will be waiting when they sign on!

3 BULLETIN BOARDS.
You can *post announcements,* or check the listings of other members. There are lots of boards for hobbies and special interests! If you don't find the one you're looking for—create your own!



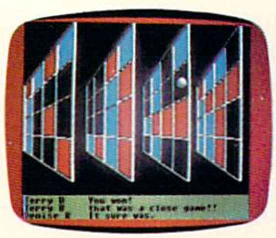
4 FILE TRANSFER.
You can even *transfer non-commercial programs* to other members! There is a small extra fee for this service.



5-17 GAMES! GAMES! GAMES!
PlayNET lets you play exciting games with real people, not just a computer. All our games have *full color* graphics, and they're all *interactive!*

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CREATING YOUR OWN GAMES ON THE VIC AND 64

A GAMEBOARD BIGGER

If you're one of the ancient ones, like me, who reached maturity (or at least adult size) without ever having seen or heard of a videogame, then chances are you grew up with such classic board games as *Monopoly, Careers, Life*, and *Clue*.

My parents put up with endless hours of these games as my siblings and I made thousands of dollars with *Monopoly*, hundreds of thousands with *Careers*, and millions with *Life*. We managed to live through these games without concluding that life was just a matter of making money—even though the game of *Life* even pays you for your children!

After all, if the money games got too intense, we could always play *Clue*. Then all we had to worry about was whether the victim was bashed about with a wrench or a lead pipe. Greed or violence. (You might want to remind people of what those classic family games are like when they complain about too much violence in videogames.)

HOW TO DO BOARDS BETTER

All four of these board games are simulations. *Monopoly* is a real estate simulation, *Careers* and *Life* are self-explanatory, and *Clue* is a crime-solving simulation.

But they aren't simulations the way that war-game simulations are simulations. I mean, you practically have to have gone to West Point to play some of those—and it helps if you have a few clerks and aides-de-camp to help you play.

Instead, these games have simplified the real-life situation greatly. For instance, in *Monopoly* you don't haggle over the price of real estate. You can't do leveraging or leasing. The interest rates don't fluctuate. The property doesn't deteriorate.

Now, chances are that the average computer gamewright would look at *Monopoly* and say, "Hey! Let's do a *Monopoly* where you can haggle, where you can leverage and where you have to lease out the property, where the interest rates change and the property deteriorates."

I can guarantee you that with a few brilliant exceptions, the games that are created by such a gamewright will be garbage.

After all, if I wanted to spend hours and hours worrying about interest rates, property deterioration, and leasing, I would have gone into property management as a career. Too many computer games turn playing into as much work as the real thing.

The idea of *play* is to keep it simple. The value of these board games is not that the player gets to become a property manager or a detective. The value is that the game creates a competitive world that can be purposefully explored.

There are jobs to do in all these games—get control of blocs of property, achieve career objectives, amass a fortune and a family, or solve a murder. But the actual tasks that the player performs are very simple. There's no great strategy involved. You don't have to be an expert at anything except counting dots on dice.

It isn't the *challenge* of the game that's fun. It's the *world* of the game, and the stories that the game tells.

I was playing *Life* with my kids on Thanksgiving Day. Emily was heartbroken when she got through the game with no kids. "I want to play again and have lots of kids," she said. Geoffrey was also caught up in the events of the fictitious life that the spinner created for him. As primitive and limited as the game world is, it still allowed us to "live" small vicarious lives during an hour and a half on a holiday afternoon.

And Geoffrey and Emily, ages 6 and 4, could understand almost everything that was going on.

Unlike abstract strategy games and complex simulation games, these story games don't need the computer to make them more difficult and complex.

Instead, they need the computer to make the *world* of the game more varied and interesting. To make the story more compelling.

A DETECTIVE GAME IN A GREAT BIG HOUSE

As I promised last month, this month's game project is to make a super game board for a *Clue*-like game. We'll use the computer to make a mansion that is much bigger, with many more rooms and levels and secret passages, than is possible on a regular cardboard playing surface.

The limitation of the cardboard game world is that it has to be small enough to be folded up and put in a box.

The limitation of the computer game world is that it has to fit on a 25-by-40 computer screen. (Sorry, VIC owners—this month's game is only possible on the Commodore 64, though the principles apply to every computer.)

At first glance, this implies that the playing surface has to be *smaller* than the game board. However, by using the computer's memory to the maximum—and I mean *maximum*—we can create a game world twelve times the size of the screen, and far larger than anything you'd ever find in a cardboard box.

The programs included in this issue of *Ahoy!* create a four-story mansion (including the basement). Up to six players can take turns exploring. Starting in the Dining Room or Par-

THAN THE SCREEN

BY ORSON SCOTT CARD

By playing games with memory, we can get a playing field 12 times the size of the screen.

lor on the main floor, players can go outside and walk completely around the house; go west into the Kitchen, Pantry, Laundry, and Family Parlor; go north into the Library, Study, and Ballroom; or go upstairs to the really nice bedrooms—like the Van Gogh Room, the Wyeth Room, the Vermeer Room, the Picasso Rom, or the Tapestry Room.

There are dozens of closets and as many water closets as you'd expect to find in such a mansion. The basement has a Billiard Room, a Den, the Garage, a Workshop, and rooms for the Maid, Butler, and Chauffeur. The attic is the children's domain: a Play Room, a Train Room, a School Room, and bedrooms for Cecil, Freddy, and Amy. There's also a Studio, plenty of crawl space under the eaves, and a Secret Room that can only be reached by players who find the secret passages.

And here's an advantage of the computer over the cardboard playing surface. The secret passages really are secret. Their entrances look just like any other part of the house. But you can find them by pushing on walls here and there. Once you find one, you are whisked away to another part of the house, where the secret passage comes out. Most of the time (but not always!) the passage deposits you very near *another* secret entrance.

Some of the secret passages, like the one between the Greenhouse and the School Room, are the same every time you play—entering in one always leads you to the other. Most secret passages, though, can change from game to game. There's always a way to get to the crawl space and the Secret Room—but it isn't always the *same* way as the game before. The entrances are in the same places, but you can't be sure from game to game where they'll all come out.

Players use the SHIFT and COMMODORE keys to move left and right, and the f5 and f7 keys to move up and down on the screen. To go from one floor to another, you either use secret passages or stairways. When you reach the head of the stairs, you are placed on the next floor above or below. Likewise, when you try to move into a wall or window or floor space that is the entrance to a secret passage, you are automatically placed where that passage leads.

At the bottom of the screen you will see the number of the player whose turn it is and the name of the room that player is in.

I have deliberately not finished the game—there's no system for handling clues or solving the crime. I have to leave *something* for you to do. But I have everything ready for you. Each player gets up to 75 movements in a single turn. At any time before that, the player can press the space bar to end his turn. Right now, at the end of a turn control passes immediately to the next player. But as you do your own programming, it will be relatively simple for you to insert routines that allow the player to examine the room he or she has stopped in, looking for clues or questioning suspects who happen to be in the same room.

As you develop your own game using this display, don't try to slavishly duplicate *Clue*. For one thing, you can be sued blind. For another thing, *Clue* depends on information being passed secretly from one player to another. This means *Clue* is impossible to play alone and pretty stupid with only two players. Your computer game should be as simple as *Clue,* but it cannot possibly tell one player something that another can't see. Secrecy just can't be part of the game.

Besides creating the actual play of the game—the win conditions, the clues, etc.—you can also modify the display. For instance, you could add custom characters among the non-inverse graphics characters to represent other furniture, like beds, a piano for the conservatory, a billiard table, bathtubs, etc. As long as you don't want the player to be able to move onto those objects, they can be added to the display *after* the display has been created using the present program, without any modifications at all to the play of the game.

Even if you don't plan to add anything to the program, I believe you'll have a lot of fun just exploring the place, looking for secret passages and seeing where they come out. It's a lot of typing, I assure you—but by the time we're through looking at the programming techniques, you'll understand why. And when you understand everything going on in this program, you will definitely be at least an intermediate BASIC programmer, even if you weren't one before.

GETTING THE MOST OUT OF MEMORY

The mansion takes twelve full screens—all 52 rooms of it (or pseudorooms—the program counts Lawn and Deck and Hot Tub as rooms), not to mention bathrooms and closets. Each screen held in memory takes a thousand bytes, and each must begin on a 1K boundary. Add to that a 2K custom character set, and you can see 14K of memory used up


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in a single video whack.

If you were with us when we did animation by flipping character sets, you already know that all video memory in the Commodore 64 has to be in a single 16K block, starting either at address 0, 16384, 32768, or 49152. Within that block, a custom character set can be placed at any 2K boundary, and screen memory at any 1K boundary.

When we were animating, we set up three or four character sets at different 2K boundaries within the video block. Then we flipped from one to another by POKEing a different 2K block number into the lower four bits of location 53272.

Now, to flip from one *screen* to another, we have only to POKE a different 1K block number into the *upper* four bits of location 53272. After allowing 2K for a character set, we have a total of 14 possible 1K blocks for screen memory.

There's another step, though. If we want BASIC to be able to PRINT on the screen, we also have to tell BASIC where the screen is. So in addition to POKEing the upper nybble of 53272 with the 1K block number (a number from 0 to 15, representing the 1K boundary where that screen memory block begins within the video block), we also have to POKE location 648 with the page number where screen memory begins. Otherwise the screen will show one section of memory, but BASIC will be PRINTing on a different one.

The page number and the 1K block number are very different, but they are both derived from the same address. Here's how you do it.

Let's say we're using the video block from 16384 to 32767. (Actually, we don't have much choice about the matter. As long as we're programming in BASIC, no other block has enough free RAM.) We'll put the character set in the highest 2K block, the one with the code 14. Then we'll put the twelve screens in the blocks with codes from 2 to 13.

The actual address of the first screen is 16384 (the video block address) plus 1024 times 2 (the block code number). That means that the address of the first screen is 16384+1024*2, or 18432. Remember, the block code is 2. That's the number that you POKE into the upper four bits of 53272:

```
POKE 53272,(PEEK(53272)AND
15)OR 2*16
```

This tells the video chip where to find the screen.

To get the page number, we divide the address by 256, and POKE the result into location 648:

```
POKE 648,INT(18432/256)
```

Of course, in the actual program, we use variables for all these values. The video register address is contained in VR. The BASIC register address is contained in BR. The 2K block code number of character memory is contained in the variable CM.

The array DA*(n)* contains the actual address of each of the 12 screen blocks. These addresses are used when the program has to PEEK into screen memory to see what character the player's figure is going to move across.

The array DM*(n)* contains the 1K block code of the screens *combined with* the 2K block code of character memory. These codes are POKEd into VR, the video register, to switch from screen to screen. (Because the character block code is already combined with the screen block code, the program doesn't waste time combining high and low nybbles every time.)

The array DB*(n)* contains the page number of the screens, which can then be POKEd into BR (location 648).

The variable P contains the number of the player whose turn it is. If there are six players, then P will be a number from 0 to 5.

The array variable PW*(n)* contains the number of the wing of the house—the screen, in other words—that a particular player figure is in.

So let's say that Player 3 is taking his turn, and he moves from one wing of the house into another. Let's say he's entering the first screen, the one at screen block 2.

The variable P will contain a 3, for player 3. Then the variable PW(P) is given the value of the first wing—which is 0. (The wings are numbered from 0 to 11.) This number, in turn, is used to index all the other variables as each of these tasks is performed:

The video register is changed: POKE VR,DM(PW(P))

The BASIC register is changed: POKE BR,DB(PW(P))

And we can PEEK into that wing's screen memory by using PEEK(DA(PW(P))).

Because we have already set up all these variables, you'll notice that not a bit of calculation is necessary in order to perform the actual switch from one screen to another.

MEMORY PROBLEMS

Simple as this is, there are still memory problems. Even with the 40K of usable memory the Commodore 64 gives you, we are definitely pushing the limits of the machine.

After all, we have to create the screen display. That means PRINTing custom characters to fill up twelve screens. The blank spaces on the screen aren't all the same, either—the entire floor of each room is composed of a character unique to that room. That is, the floor of the Parlor is made up of inverse J, the floor of the Dining Room is inverse K, and the floor of the Conservatory is inverse L. They all look the same on the screen, but when we PEEK into screen memory to see where the player figure is, the character we find there tells us instantly which room the figure is in.

That means that if we didn't play some tricks, it would take 12K of DATA statements to contain all the information necessary for the 12K of screen memory. Since the DATA statements are in the BASIC program area and screen memory is in the video block, that means 24K is used up without any other programming! And this becomes all the more crucial when you realize that since the screens start at the 18K boundary and the BASIC program begins at the 2K boundary, we only have a total of

16K for the whole program!

Obviously, something has to give way. The solution is in three parts: *data-packing, memory manipulation,* and *data files.*

DATA FILES

The most obvious solution is to split the game into two programs. The first program, listed in this issue as *Mansion Display Setup,* does nothing but create the character set and the 12 screens in memory, and then SAVE a copy of that section of memory in a file named "DISPLAY DATA" on disk or cassette. This is done by changing a couple of pointers in low memory, issuing a SAVE command, and then restoring those pointers.

Then, because of the kind of SAVE command the program issued, the second program (listed in this issue as *Mansion Game*), issues a LOAD command that automatically brings the entire video block into memory straight from disk or cassette, at exactly the right memory locations.

What does this mean? Only that the entire video memory can be loaded straight from disk without a single DATA statement being used for that purpose. That gives us back 12K of program space.

It also means that you need to RUN *Mansion Display Setup* only once, to create the DISPLAY DATA file. From then on, *Mansion Game* is all you need to RUN in order to play the game. (However, if you plan to alter the display, you will need to make your changes in *Mansion Display Setup* and create new versions of DISPLAY DATA.)

A note to cassette users: The programs are designed for use with a 1541 disk drive. You will need to change three program lines to use a datasette. In the program *Mansion Display Setup,* change these lines:

```
100 [ELIMINATE THIS LINE]
120 POKE 43,0:POKE 44,72:P
OKE 45,0:POKE 46,128:SAVE
"DISPLAY DATA",1,1
```

In the program *Mansion Game,* change line 50090 to:

```
50090 LOAD "DISPLAY DATA",
1,1
```

WARNING: It is absolutely vital that you always SAVE both programs as soon as you type them in, *before* you RUN them. That's because both programs manipulate BASIC pointers, and if something should happen—like a typing error—to cause the program to break, the pointers will be all wrong. You could end up SAVEing, for instance, a program fully 32K long—three-fourths of which would be meaningless. Or losing the whole program—and all your typing time.

ANOTHER WARNING: Before you RUN *Mansion Display Setup,* make sure you have another blank cassette or at least 53 free sectors on a diskette, since that program's whole purpose is to create a cassette or disk file of about that length. Cassette users will end up needing three cassettes: one for *Mansion Display Setup;* one for the data file that it creates, *Display Data;* and one for *Mansion Game.* For diskette users, *Mansion Display Setup* also SAVEs itself first, just in case you forgot, as the disk file DISPLAY SETUP.

DATA-PACKING

To save memory in *Mansion Display Setup*—and to save you typing time (I do try to do that, you know)—the program uses data-packing to store the screen displays. The large floor areas, after all, require many repetitions of the same character, row after row. An unpacked system might store three rows of the display like this:

```
52000 DATA "AAAABCCCCCEECCC
CCEECCXCCEECCCCCEECCCCCMA"
52001 DATA "AAAADRRRRRRRRRR
RRRRRRDRRRRRRRRRRRRRRRRDA"
52002 DATA "AAAADRRRRRRRRRR
RRRRRRDRRRRRRRRRRRRRRRRDA"
```

In this scheme, A would be the lawn outside, D a vertical wall segment, B, M, and X corner wall segments, C horizontal walls, E horizontal windows, and R the floor area.

But our program looks for floor characters and automatically expects to find them followed by another character whose ASCII value is a code for the number of repetitions of that floor character. For instance, line 52001 would look like this:

```
52001 DATA "A4DR@DR@DA1"
```

The program recognizes that A and R are floor characters. So it gets the next character in the string, calculates the ASCII value, and subtracts 48 to get the number of repetitions. (I used that system so that low repetitions would be shown by the ASCII characters 1 through 9, which have the ASCII values of 49 through 57. Then 10 is represented by a colon, 11 by the semicolon, and 16 by the " @ " character.)

So the program reads the packed line this way: PRINT 4 repetitions of A, then PRINT D, then PRINT 16 repetitions of R, then D, then 16 R's, then D, and then 1 A.

Notice that when only one floor character is needed, it take two characters to say so: A1. But since most of the time many more than one or two floor characters are PRINTed in a row, this system saves endless problems in typing 40-character strings.. After all, there are 288 DATA statements involved in creating the screen displays, and another 91 to create the character set.

This system requires that the character set be carefully planned. First, the game requires that the regular character set be available for PRINTing readable words—so all the custom characters are put in the second K of character memory, replacing the inverse characters. However, inverse characters can't be included in DATA statements, so the packed DATA statements include the regular characters, and the program converts them to inverse characters when they are PRINTed into screen memory.

Second, all the characters that a player can move onto are grouped together in character memory. The

floor characters, which can be repeated, are "A" through "4". Then other characters that can be walked through but which are *not* repeated—doors, mostly—are grouped as characters "5" through "=". Then the stair-end characters, " > " and "?", are followed by the wall, window, counter, sink, toilet, rock, and midair characters, which are graphics characters from SHIFT-A through SHIFT-U. Finally, there are the secret passage entrances, which look like wall, window, or blank floor units, but which are really graphics characters from SHIFT-V through SHIFT-Z.

Because of this grouping, when the game program PEEKs into screen memory to see what character the player is trying to move onto, it can check the number and instantly decide how to handle the move. If it's an illegal move onto a wall, window, counter, sink, toilet, rock, or midair, the move is rejected and the player figure stays where it is. If it's a legitimate floor character, the program moves the figure—but also uses the number to help it PRINT the room name. If it's a stair-end character (or an attempt to move off the screen), the program prepares to flip to another screen. And if it's a move onto a secret passage entrance, the program jumps to another routine to see where to go next.

So you can see that the screen display isn't just a matter of making a pretty picture. By careful planning, you can use that picture to carry a lot of information that the program uses to make a playable game and a fascinating world to explore.

MEMORY MANIPULATION

This is a very tricky part of programming that involves fooling the computer into doing things it isn't really meant to do. I don't recommend you do a lot of this sort of thing, because strange things can happen. I do recommend that you not even dream of doing it unless you own a good memory map which contains lots of explanations about how to play tricks with memory. The book I use is Sheldon Leemon's *Mapping the Commodore 64* [COMPUTE! Books, $14.95]. You'll learn an awful lot about your computer just by browsing through it. Not exactly a mystery novel, but it gives you an idea of some of the stuff actually going on inside your machine.

I'm not going to try to give a whole course in BASIC memory use right now—just enough to let intermediate programmers know what I'm doing so they can fiddle with it. *Mansion Display Setup* temporarily changes the pointers at 43-44 and 45-46 so the computer will think the BASIC program starts at 18432 and ends at 32767. Then the statement SAVE "@0:DISPLAY DATA",8,1 (or SAVE "DISPLAY DATA",1,1) saves everything between those addresses, along with the address. The resulting file will automatically LOAD back into the right place in memory.

Mansion Game does something even trickier and potentially more dangerous to your sanity if something goes wrong. It changes the pointers at 45-46, 47-48, and 49-50 to point to 32768. This is done before a single variable is invoked by the program. This has the effect of moving all BASIC variable storage—everything that BASIC uses except for the program lines themselves—*above* the video control block, into the 8K just before BASIC ROM.

This means that the 16K *below* the video block and above 2048 is entirely free for BASIC program lines, while the 8K *above* the video block is used entirely for variables. This allows the maximum use of memory, but it also requires another warning.

WARNING: As you develop your own game using this display and movement program *(Mansion Game)*, try not to add too many new variables, especially memory-eating arrays and strings. This is because all that stuff goes into an 8K section of memory, which can vanish pretty quickly. The FRE*(n)* function performs some garbage collection in there, and then measures the amount of memory between the top of string memory and the bottom of array memory. However, FRE*(n)* will be misleading, because your program lines don't affect this section at all. Those are all kept starting at 2048 and building upward, and there's nothing at all to stop them from bumping right into the video block. If you add too many program lines, then when the program LOADs the display data from disk or cassette, it will plunk it right on top of your program lines and you can get a very nasty mess. However, the highest lines in the program right now are the ones that will be least damaged by being written over, so even then you have some flexibility.

If you want to see how much memory your BASIC program is using up, then without ever running the program since the last power-up, enter this command in direct mode:

```
PRINT 18432-(PEEK(45)+256*
PEEK(46))
```

This tells you how much space is left between your program lines and the beginning of screen memory. If you get a negative number, even after switching the machine off, powering up, and reLOADing the program, then your program is too long and will be over-written by the display.

ANOTHER WARNING: If you enter and exit the program normally, the program automatically restores the BASIC pointers where they were at the beginning. If the program is interrupted, however, even pressing RUN/STOP-RESTORE won't set things back to rights. For that reason the program disables both RUN/STOP and RESTORE during the game. The only way to stop the program is to press RETURN. However, if you have changed the program or made a typing error and the program breaks in the middle due to an error, you had better have a SAVEd copy of the program, including your changes, because even if you fix the error you cannot SAVE a good copy of the program with the pointers mixed up. You will have to (sorry about this) turn off the machine, reload the program, and then

Continued on page 98

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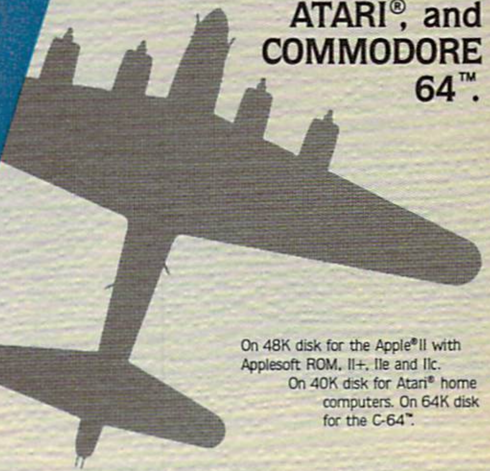
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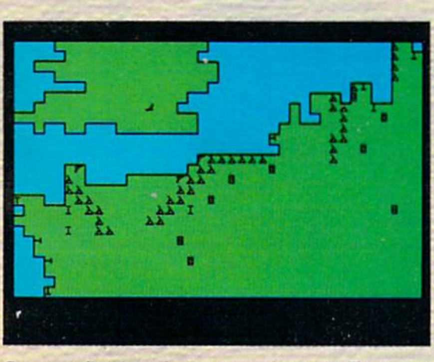
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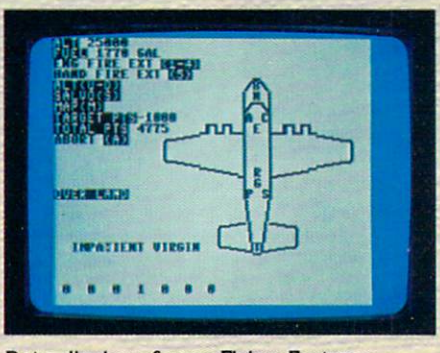
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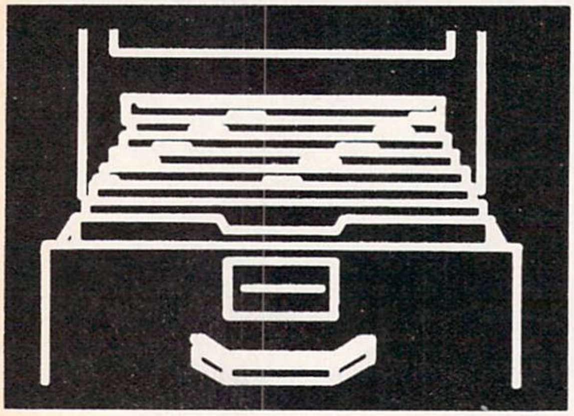
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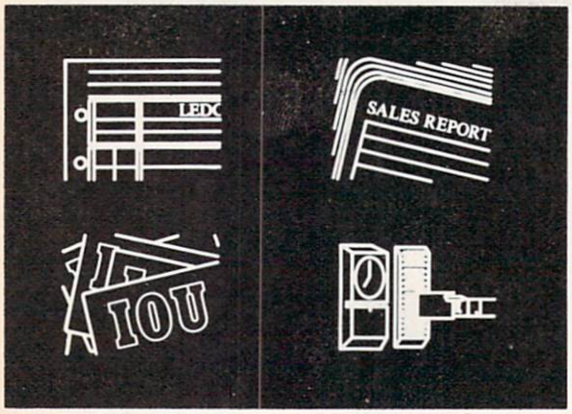
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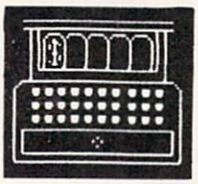


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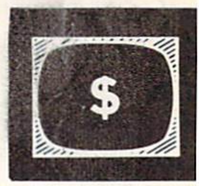
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PROGRAMMABLE *Functions for the C-64* By Dex T. Peterson

Have you ever attempted to use one of the Commodore 64's programmable function keys from direct BASIC mode? If you do, it will appear to do nothing. That's the reason I wrote this program. Some programs allow you to use a function key from within the program, but until now using them from direct BASIC has been taboo.

I consider a programmable function key (PFK) to be a special type of key with its own characteristics:

❶ Transient to the operating system, each key is independent and is able to be used from a direct mode of operation.

❷ When activated, performs a specified group of instructions or commands.

❸ Can be displayed and/or reprogrammed; each key is not limited to only one preset definition.

This utility offers some outstanding characteristics, and is compatible with the DOS 5.1 wedge program and any other program that uses the 4K block of memory from 49152. I have chosen to reserve 4K from the top of BASIC to operate this routine. This allows me to save and replace the original BASIC environment. Considering the 38K Commodore gives the 64 for BASIC RAM, most applications will not even miss the storage required for this program. Furthermore, present programs that detect function keys will still operate properly in most instances. This utility also lowers BASIC and protects itself from being overwritten by an active BASIC program as well.

The ability to detect the function keys from direct mode comes from another routine I developed to do such testing. This routine is appended to the normal hardware interrupt vector at locations 788 and 789 ($0314 - $0315). Pressing RUN/STOP and RESTORE simultaneously will reset the computer and disable the programmable keys; to reactivate them simply type SYS38784 and press RETURN.

The utility maximizes use of the keyboard buffer, allowing up to ten keystrokes to be replaced with only one. When you redefine one of the keys' functions it is important to define it as a command that would normally be entered from the keyboard, and be ten or fewer keystrokes in length. I leave the entire block from 49152 to 52224 free for user routines, allowing better compatibility with other ML programs. If you do not use the DOS 5.1 wedge program, then even more user space becomes available, from 49152 to 53242. I designed this utility to complement the BASIC environment; it will not harm any program in memory, and no program in memory can affect the keys when they are operational. BASIC keywords and SYS calls to a trace or proofreader routine are only two of the many uses for this utility program. Direct BASIC commands to change the internal operation of the system are perhaps my favorite use of this utility; an example of such use would be to turn on or off the repeating keys (with a single keystroke). If you should ever experience problems with another program that tests the function keys as well, simply redefine the key(s) causing the problem to five spaces and five deletes; this will make the key respond as if it were never programmed. Do not think that redefining a key with no command will do the same thing. By not entering anything, the key will default to a definition of ten spaces. For ease of use I suggest that commands which don't require the carriage return and are fewer than ten keystrokes be padded with cursor controls, or spaces and deletes to leave the cursor in the most convenient location following the key.

This program is entirely machine language; I have provided the listing in BASIC loader format for simplicity in entering the utility. Once you have entered the listing, SAVE it before running; once you have it running you will find out how easy and friendly the program is. When the program is RUN, the definition of each function can be viewed with a SYS36864, but don't enter that yet. I have preprogrammed F8 (SHIFT F7) to perform the SYS for you; press F8. You are now looking at screen #1, the definitions. They are:

F1: LIST	+CHR$(13)	F2: RUN	+CHR$(13)
F3: POKE650,128	+CHR$(13)	F4: POKE 650,0	+CHR$(13)
F5: LOAD"		F6: SAVE"@0:	
F7: SYS 49152	+CHR$(13)	F8: SYS 36864	+CHR$(13)

F1 and F2 are self-explanatory; F3 and F4 required me to abbreviate the POKE to P-SHIFT-0 to keep within the ten keystroke limit. They turn the repeating key function on and off respectively. F5 and F6 are examples that do not require a carriage return, F7 executes any ML program located at 49152, F8 initializes the display and define ML control program. You may also choose your own definitions. Disk wedge commands are valid.

To change a definition enter the corresponding number of the key you wish to change; the former definition is changed to spaces, and you are prompted to enter the new definition. If the new definition uses the entire ten allowed keystrokes, the program returns to the first screen. Should the new definition be fewer than ten keystrokes, press the RETURN key and you will be given the opportunity to add a carriage return to the new command. After answering this prompt you will return to the first screen reflecting the changes made. Returning to the BASIC environment is as easy as pressing the zero from screen one. This is also the most dramatic portion of my utility, as I restore the user's original BASIC environment exactly as it was when the display and define routine was initialized.

I encourage you to send me your comments concerning this program. I will answer all responses that include a stamped and self-addressed envelope.

Integrated Systems
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SEE PROGRAM LISTING ON PAGE 76

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Old Routine

for the C-64

Most BASIC programmers have at one time or another NEWed a program by mistake. If this happened while typing in a very long program listing, it was probably even more frustrating. Commodore BASIC needs an OLD command to undo the damage done by haphazard NEWs. Unfortunately, Commodore chose not to implement an OLD command on the 64. Adding such a command to the 64, though, can be very easy.

HOW OLD WORKS

The NEW command zeroes out the first three bytes of the BASIC programming area and resets some pointers that tell the computer where your BASIC program ends. NEW, however, does not destroy your BASIC program – the program remains intact in memory. The only thing that will destroy your BASIC program is typing NEW and then assigning some values to variables. After a NEW, variables will overwrite your program. The OLD command first resets the second and third byte of the BASIC programming area. These two bytes are pointers to the next BASIC line. The machine language program scans the beginning of the BASIC area for the next line. This is easy to pick out because the end of a BASIC line will always hold a zero byte. When you type OLD, the program searches for this zero byte and then sets the two bytes to point to the memory location following the zero. The two memory locations following that zero are the pointers to the third BASIC program line. This kind of linking continues until the end of the program.

THREE ZEROES

The end of the program always holds three zeroes. The first zero signals the end of a BASIC line and the next two zeroes are where the pointer to the next BASIC line would normally be. Since there is no other BASIC line, the two zeroes are there to indicate that the end of the program has been reached. The newly implemented OLD command searches for these three consecutive zeroes and sets the end of program pointers (45 and 46) to the location just past the last zero. These two pointers are used during SAVEs and are also used to signal the operating system where it can begin storing variables.

By Robert Alonso

USING THE PROGRAM

Keep in mind that you should not assign variables after a NEW, because then the OLD command will have no effect. Another thing to remember is that the OLD command replaces the LET command. The LET command was chosen because it is almost never used. If you do use the LET command, you will have problems. Any LET will cause a SYNTAX ERROR to occur.

As an added feature, the OLD command gives you the end address of your program. If you would like to know where your program ends, just LOAD it with OLD in place and type OLD. The OLD command will print the end address on the screen. Doing this will not damage your programs. If you have accidentally NEWed your program, the OLD command will both restore it and print its end address on the screen. □

SEE PROGRAM LISTING ON PAGE 78

CORRECTION TO TELELINK 64

(February '85 *Ahoy!*)

In what certainly ranks as the most embarrassing mistake in our 15-issue history, the BASIC portion of last issue's *Telelink 64* was omitted. It is listed below. Refer to the article for further instructions.

```
•10 POKE45,0:POKE46,19:POKE56,21:POKE52,2
 1:CLR                                    PA
•20 S=54272:POKES+5,12:POKES+6,0:POKES+24
 ,15:POKES+1,25:POKES,177:POKE808,239     NO
•30 SYS6390                               HE
•40 OPEN2,2,3,CHR$(6)                     CD
•50 POKE251,PEEK(6154):POKE252,PEEK(6155) AA
•100 POKE54276,0:PRINT"[CLEAR]":PRINT"[15
 " "]MAIN MENU":PRINT:PRINT               IC
•110 PRINT"1 TERMINAL":PRINT              EL
•120 PRINT"2 SEARCH TEXT":PRINT           OP
•130 PRINT"3 SAVE":PRINT                  EG
•140 PRINT"4 LOAD":PRINT                  DA
•150 PRINT"5 SAVE TO PRINTER":PRINT       DI
•155 PRINT"6 BUFFER":PRINT                NF
•160 PRINT"KEY DIGIT"                     HJ
•170 GETA$:IFA$<"0"ORA$>"6"THEN170        PG
•190 ONVAL(A$)GOSUB300,800,400,500,600,70
 0                                        KA
•200 GOTO100                              CF
•300 PRINT"[CLEAR]":POKE53272,23:SYS6528  JD
•310 PRINT"[CLEAR]":POKE53272,21:PRINT"HA
 VE YOU LOGGED OFF?"                      GE
•320 FORA=1TO3000:NEXT:RETURN             IC
•400 PRINT"[CLEAR]":PRINT:PRINT"[14" "]SA
 VE MENU":PRINT:PRINT                     GH
•410 PRINT"1 SAVE SELECTED TEXT":PRINT:PR
 INT"2 SAVE ALL TEXT":PRINT               AP
•415 PRINT"3 ABORT THIS FUNCTION":PRINT   OG
•420 PRINT"KEY DIGIT":PRINT               DN
•430 GETAA$:IFAA$<"1"ORAA$>"3"THEN430     LI
•440 IFAA$="3"THENRETURN                  LJ
•450 GOSUB590:OPEN1,A,1,F$                JH
•460 SYS-(6240*(AA$="1"))-(5824*(AA$="2")
 )                                        CP
•470 CLOSE1:RETURN                        JG
•500 PRINT"[CLEAR]":PRINT:PRINT"[14" "]LO
 AD MENU":PRINT:PRINT                     KO
•510 PRINT"1 LOAD":PRINT:PRINT"2 ABORT TH
 IS FUNCTION":PRINT                       PN
•520 PRINT"KEY DIGIT":PRINT               DN
•530 GETA$:IFA$="2"THENRETURN             JB
•540 IFA$<>"1"THEN530                     BN
•550 GOSUB590:OPEN1,A,0,F$                JE
•560 POKE6151,A:SYS6291:CLOSE1:RETURN     HC
•590 F$="":INPUT"FILENAME";F$             FC
•591 IFF$=""THENPRINT:GOTO590             JA
•592 PRINT:PRINT"TAPE OR DISK?"           FN
•594 GETA$:A=1:IFA$="D"THENA=8:F$="@0:"+F
 $:RETURN                                 MO
•596 IFA$<>"T"THEN594                     FG
•598 RETURN                               IM
```

```
•600 PRINT"[CLEAR]":PRINT:PRINT"[13" "]PR
 INTER MENU":PRINT:PRINT                  LA
•610 PRINT"1 PRINT ALL TEXT":PRINT:PRINT"
 2 PRINT SELECTED TEXT":PRINT             KM
•615 PRINT"3 ABORT THIS FUNCTION":PRINT:P
 RINT"KEY DIGIT":PRINT                    LH
•620 GETA$:IFA$<"1"ORA$>"3"THEN620        NG
•630 PRINT"OK":OPEN4,4:ONVAL(A$)GOTO650,6
 60,690                                   EB
•650 FORA=6656TOPEEK(251)+PEEK(252)*256:G
 OTO680                                   OI
•660 FORA=PEEK(6152)+PEEK(6153)*256TOPEEK
 (6154)+PEEK(6155)*256                    OO
•680 PRINT#4,CHR$(PEEK(A)AND127);:NEXT:PR
 INT#4                                    ND
•690 CLOSE4:RETURN                        KB
•700 PRINT"[CLEAR]":PRINT:PRINT"[13" "]BU
 FER MENU":PRINT:PRINT                    FP
•710 PRINT"0 RESET BUFFER":PRINT:PRINT"1
 BUFFER ON":PRINT:PRINT"2 BUFFER OFF"     PM
•720 PRINT:PRINT"3 ABORT THIS FUNCTION":P
 RINT:PRINT"KEY DIGIT":PRINT              BP
•730 GETA$:IFA$<"0"ORA$>"3"THEN730        AN
•740 IFA$="0"THEN780                      EF
•750 IFA$="1"THENPOKE6150,0:PRINT"BUFFER
 ON":FORA=1TO2000:NEXT                    AM
•760 IFA$="2"THENPOKE6150,1:PRINT"BUFFER
 OFF":FORA=1TO2000:NEXT                   KN
•770 RETURN                               IM
•780 POKE251,1:POKE252,26:POKE6152,1:POKE
 6153,26:POKE6154,1:POKE6155,26           CF
•790 PRINT"BUFFER RESET":FORA=1TO2000:NEX
 T:RETURN                                 AG
•800 PRINT"[CLEAR]":PRINT"DISPLAY BUFFER"
 :PRINT                                   GG
•810 SYS5377                              HO
•820 RETURN                               IM
```



NEW COMMODORE COMPUTERS

The just-announced Commodore 128 Personal Computer (top) and LCD Portable Computer are the most exciting releases to come out of Commodore since the 64 itself. See next month's *Ahoy!* for a look at these new machines.

Automatic Line Numbers for the C-64

By Tim Midkiff

This handy utility will automatically print program line numbers. When the program is in operation, a line number will be displayed after every RETURN, with each successive number higher by a given increment.

The program options are controlled by the function keys. The F1 key toggles the program on and off. When the program is off, the computer operates as normal. Turning the program on and off does not change any of the program values. The F3 key toggles between typing the line number alone or typing the line number followed by the DATA statement. The F5 key allows you to change the line number increment (0-255). The F7 key allows you to change the line number. When changing the line number or the increment, enter the desired number and press RETURN; when the READY prompt appears, press RETURN again. When the program is first run, nothing happens, because the program is off; press F1 to start it. The line number at the start is zero; the increment is ten, and the DATA statement is not printed.

Save this program before running it, because it erases itself. Pressing the RUN STOP/RESTORE keys disables this program; to reactivate, use the command SYS 49152. □ *SEE PROGRAM LISTING ON PAGE 81*

Salmon Run for the C-64

By Mike Wacker

Salmon Run is a game for two players (both playing at the same time) that lasts for three minutes. Use control port 1 to manipulate the black bird and control port 2 for the blue bird.

The object of the game is to catch the most fish and place them in your nest. The large fish are worth 2 points each and the small fish 1 point each. The black fish have been contaminated by mercury; if you catch one, you'll be slowed down.

It is possible to catch more than one fish at a time, which can be a useful tactic. Also, you can steal fish out of your opponent's claws.

The only way you can catch a fish is to fly above your nest level and press the fire button. You will then dive in an attempt to catch a jumping salmon.

Scoring is kept at the top left and right corners of the screen. The high score is also kept. □

SEE PROGRAM LISTING ON PAGE 79

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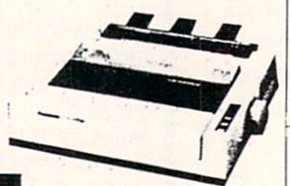
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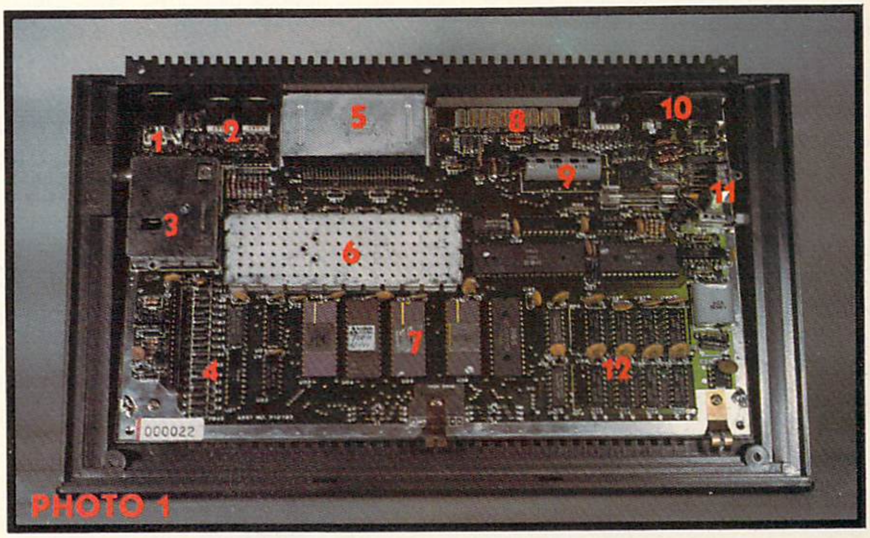
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What's Inside the Plus/4?

By Morton Kevelson

Commodore has packed a lot of new material into the Plus/4. In addition to the bevy of built-in applications software, there is BASIC 3.5. This in many ways includes all of the commands left out of BASIC 2.0. As is our custom with new hardware, we will present an inside look at just what you will get for your money.



(1) Video monitor connector; (2) joystick; (3) RF modulator for TV display; (4) keyboard connector; (5) cartridge connector shield; (6) TED chip under metal shield; (7) 68 kilobytes of ROM; (8) user port connector; (9) 7501 microprocessor; (10) cassette port; serial port (disk drive); power connector (left to right); (11) on/off switch and reset button; (12) 64 kilobytes of dynamic RAM.
READER SERVICE NO. 208

THE HARDWARE

The Plus/4 comes in a sleeker package than the Commodore 64. However, its overall height and depth (front to back) is, within a fraction of an inch, the same as for the C-64. Nearly three inches have been lopped off the width by relocating the function keys above the top row of the keyboard. The front of the machine has been slimmed considerably, bringing the user's wrists nearly to the desk surface. The result is a trimmer package than either the C-64 or its sibling, the Commodore 16.

The circuit board of photo 1 reveals that the entire computing power of the Plus/4 is managed by a complement of only 26 integrated circuits, of which many are devoted to memory. The 64 kilobytes of built-in RAM is housed in the eight chips at the lower right hand corner. The operating system, BASIC 3.5, the character generator, and the built-in applications software are housed in six ROM chips which total over 64 kilobytes of permanent storage. The heart of the system is a 7501 microprocessor, functionally equivalent to the 6510 used in the C-64. The TED chip, which gives the machine its unique character, is housed in the large shielded enclosure near the center.

Commodore's previous experience with the VIC 20 and the C-64 is evident. Metal and foil covers keep radio frequency radiation from the keyboard and main circuit board to a minimum. All I/O lines are passed through ferrite beads for additional shielding. As a result, the Plus/4's television image is one of the cleanest we have seen. Interference on the sample we tried was virtually nonexistent.

The Plus/4 sports a new large-scale integrated circuit for handling the screen graphics and display. The TED chip replaces the versions of the VIC chip used in the VIC 20 and the C-64. TED is an acronym for "Text Editing Device," an early Commodore designation for this video display processor chip. This large scale integrated circuit is responsible for generating the video image produced by the Plus/4. It also handles game controller interfacing and sound generation.

HARDWARE COMPATIBILITY

All peripheral connectors are located at the back (see photo 2), with the exception of the television connector, which is on the left side (see photo 3). This includes the joystick ports and the power supply connector.

With regard to the major peripherals, in particular the disk drive, printer, and color monitor, the Plus/4 is very compatible. All of these can just be plugged right in without any problems. This is good news indeed. New users will have immediate access to

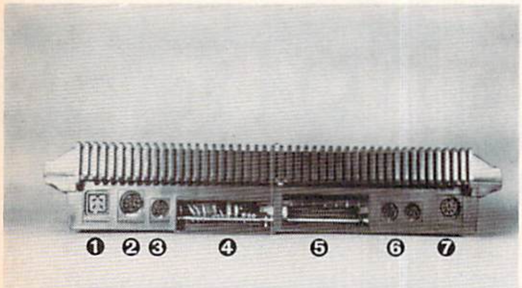


PHOTO 2

BACK: ❶ power connector; ❷ serial port for disk drive, printer; ❸ new miniature cassette port; ❹ user port (modem); ❺ cartridge port; ❻ new miniature joystick ports; ❼ video monitor port.

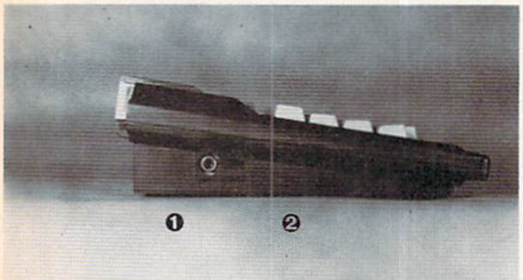


PHOTO 3

LEFT: ❶ TV connector; ❷ ¾ switch.

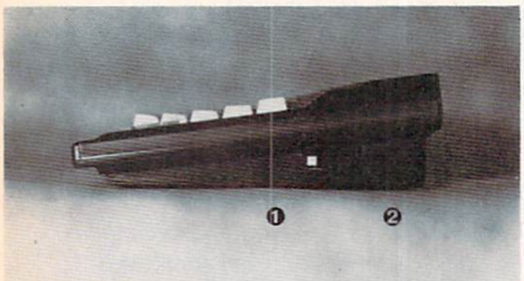


PHOTO 4

RIGHT: ❶ reset button; ❷ on/off.



PHOTO 5

The Plus/4 keyboard has relocated the function keys to the top row and grouped the cursor keys into a diamond pattern.

a full line of low cost, tried and proven major peripherals. Existing users of the C-64 can add the Plus/4 to their system for a minimum of additional expense.

Minor peripherals, namely the cassette deck and the game controllers, do not fare nearly as well. Although these appear to be the same electrically, their associated connectors have been radically changed. The new connectors for these accessories are miniature, circular, eight-pin affairs, about three eighths of an inch in diameter. The official reason for this change is improved electrical shielding. We will withhold comment on this matter. However, we will expect to see a thriving aftermarket of low cost third party adapters to allow the use of existing peripherals.

THE KEYBOARD AND OTHER LITTLE BUTTONS

On examining the Plus/4's keyboard (see photo 5), two drastic changes are apparent. First, the function keys have been displaced from their traditional right hand resting place to a left hand location above the keyboard. Second, there are now four arrow-shaped cursor keys in a diamond pattern. Several other subtle keyboard changes will afflict veteran C-64 users at inopportune moments.

The Plus/4 sports a true Escape key as well as two Control keys. One of the latter has displaced the RESTORE key. Several other symbols, namely pi, the British pound, and the left and up arrows have been shifted around as well. Observant readers may have noted Flash On and Flash Off markings as well as subtle variations in the available colors. More on this later.

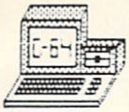
The most notable omission is the lack of a RESTORE key, that first line of attack against an otherwise recalcitrant program. Have no fear, we still have an out. Actually, the Plus/4 has what appears to be a true reset button. Tucked away next to the power switch, on the right side of the machine (see photo 4) is a small grey square which resets the computer to the power on state. If you hold down the Run/Stop key while simultaneously depressing the aforementioned Reset button, the computer will jump to the built-in machine language monitor. It now remains for you to type "X" for exit and you will be back in BASIC with the original program intact.

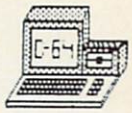
ON COLOR AND SOUND AND OTHER SUCH FRILLS

With the exception of the lack of sprites, the Plus/4's graphic capabilities are actually superior to those of the C-64. The TED chip gives the Plus/4 several display features which are new to Commodore computers. Careful scrutinization of the color labels on the top row of the keyboard reveals several new hues. The computer can generate such exotic shades as yellow green, blue green, and pink. As with the C-64, a total of 16 colors, counting white and black, are available. Each of these colors, except for black, can be displayed in eight intensity levels. The result is 121 possible hues. For example, white can actually be displayed in eight shades of gray. Photo 6 shows all the possible variations (within the limits of magazine reproduction).

The sound capabilities of the Plus/4 are rather limited when compared to the C-64 and the SID chip. The computer is equipped with two independent voices with a common volume control. The first voice is a pure tone generator. The second voice can be set for either a tone or noise. The frequency range is from a bit over 100 Hertz to beyond audibility. While this is a far cry from the SID chip's programmable ADSR, it is still capable of generating a respectable cacophony of music, nois-

Continued on page 110





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REVIEWS

MUPPET LEARNING KEYS
Koala Technologies Corporation
Commodore 64
Hardware and disk; $79.95.

The Muppet Learning Keys Kids' Computer Keyboard rates a mixed review—but mixed in only one respect. The keyboard itself is an exceptional educational tool, a sterling piece of work that no small child can help but love. The accompanying software, however, is such a sad joke that only Fozzie Bear could be responsible.

Let's dwell on the positive first. The 14 x 15" keyboard (the work area measures 9½ x 12½") should provide young children with a highly enjoyable introduction into the world of computers. Included are letter, number, and cursor keys, along with helo, "oops," and color change features, all of it colorful as all get-out and very young-user-friendly. The number keys, for example, appear on a ruler, and the cursor keys on a compass—backgrounds easily identifiable with the keys' functions. Additionally, the keys that are potentially the most puzzling to a child are accompanied by pictures of Muppets in helpful poses: Gonzo flying into a brick wall for the "oops" key, Miss Piggy tied to the railroad tracks for the help key.

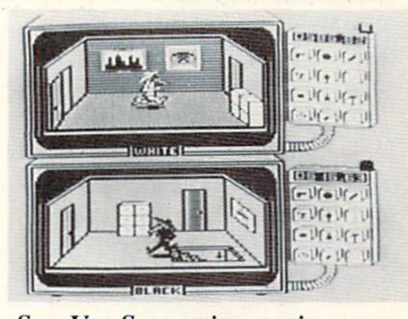
The hated membrane is actually a plus here. The surface of the keyboard has no protruding pieces, nothing to break off or stick in little eyes or mouths. If you can convince your child that touching daddy's disk drive or 64 will make the bogeyman spring from the closet, you can leave your child to play with the Muppet Learning keys unattended.

The software (produced for Koala by Sunburst Communications) consists of three programs, called "stages." They're really three versions of the same program.

In the Discovery stage, pressing any letter key will cause an object beginning with that letter to appear on



Muppet Keys, Yea; software, nay.
READER SERVICE NO. 279



Spy Vs. Spy; avian espionage.
READER SERVICE NO. 280

the screen: "a" gives you alligator, "h" hamburger, etc. Each letter always produces the same object. Press a number on the ruler and the object will multiply by that amount; press any color on the palette, and everything on the screen will turn that color.

In the Letters stage, objects materialize onstage and the child must press the correct initial letter to cause music to play and the object to move: ink spills, rocket blasts off, etc.

In the Numbers stage an object will appear in a random quantity, from 1 to 9. By pressing the corresponding number key on the ruler, the child can animate the entire crew.

If you brought a $19.95 software package home to find that it did all the above and nothing more, you'd probably make a mental note never to buy any of that company's products again. But, believe it or not, the above is about all your child can do with this $79.95 product. We can imagine that very young children could sit with the keyboard for some time, punching keys at random and being delighted by the results. But the majority will quickly shelve it and break out the Transformers.

A call to Koala relieved our minds somewhat. More software is due for release with the Muppet Learning Keys, probably by the time you read this review. We hope the coming software makes possible some of the learning scenarios that spring to mind when we first laid eyes on the wonderful keyboard with its complete sets of letters, numbers, and numerical operands. We hope the coming software is not produced under the influence of whatever philosophy motivated Koala to punch out a bad demo disk and call it educational software—be it unbridled sloth on the part of the programming team, or (shudders) a desire on the manufacturer's part to produce a toy which parents would have to support by buying many inadequate disks, rather than one or a few adequate ones. Either philosophy will make this laudable creation die on the vine.

Koala Technologies Corporation, 3100 Patrick Henry Drive, Santa Clara, CA 95052-8100 (phone: 408-986-8866). *—Martin Foster*

SPY VS. SPY
First Star Software
Commodore 64
Disk; $29.95

Any computer game is boring 50% of the time—the time you spend waiting for your opponent to finish his turn so you can take yours. If the game is particularly good, that boredom can take on overtones of agony.

First Star's *Spy. Vs. Spy* is one of the relatively (and mysteriously) few games to redress that problem. Thanks to a split screen, two players may simultaneously skulk around in the guise of the black- and white-garbed birds who for the past 20 years have been shooting each other with cannons, flattening each other

with steamrollers, and tying each other to moonbound rockets in the pages of *Mad* magazine.

You must comb an embassy building in search of four items—passport, key, money, and secret plans—which must be in hand before you can board the waiting plane and take off, winning the game. Not as easy as it sounds, 007. The items are hidden—in bureau drawers, under TV's, behind pictures. You can carry only one item at a time, unless you have your briefcase—also required for your escape, and also hidden. And only one of each of the four items exists. That means that if your opponent has one of the items, you cannot win unless you get it from him.

Most such turnovers occur as a result of hand-to-hand combat. Should you enter a room already occupied by your opponent, you and he may slug it out with the clubs that a touch of the joystick button will place in your hands. Your alternative is to leave the room. But if you can strike enough solid blows to best your opponent (he'll float up offscreen on angel wings if you do), whatever he was carrying will be hidden in the room.

Much of the essence of the *Mad* series has been incorporated into the game, in particular the strip's running gag: that of the Spy's own painstakingly laid trap backfiring on him. The Spies in this game can set traps for each other: a bomb, a gun on a string, a bucket of water above a door, etc. And true to the spirit of the original, should you forget which drawer you wired in which room, your own Spy can buy the farm in the Ukraine as easily as your opponent's. Remedies to the traps—a water bucket for a bomb, scissors for a gun tied to a string, etc.—can be found throughout the embassy, and carried along.

If you haven't guessed by now, keen joystick control is just not the name of this game. During hand-to-hand combat, yes—you'll be thankful for every quarter spent on *Pac-Man*. But the key to *Spy Vs. Spy* is concentration: remembering where you and your opponent have set traps and hidden remedies and items, requiring you to watch your opponent's game almost as carefully as your own. Just remembering your location becomes a challenge at the higher levels, where the embassies turn into sprawling multilevel structures. All of which is cake compared to keeping track of your score. The program does it for you, but following along with the fluctuations will prove a job in itself as you lose or gain points for almost everything you do, from calling up the help map (−70) to using a remedy to escape a trap (+40).

I especially enjoyed the one-player mode. It's a rare treat to have a computer assume a role identical to yours, with exactly the same goal. In this situation as in no other you get to see how your skills stack up against the machine's/program's. And let me tell you, my beak is still smarting from hand-to-hand combat on Level 5.

First Star Software, 22 East 41st Street, New York, NY 10017 (phone: 212-532-4666).

—Greg Fried

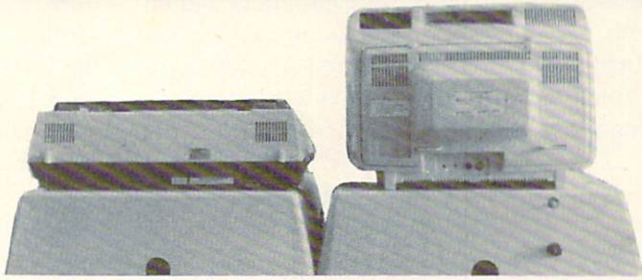
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SPEED HANDICAPPER

High Desert Publishing Company
Commodore 64
Disk; $29.95

Being a past participant in the Sport of Kings, I was elated to be given the assignment of reviewing this program. After reading the accompanying booklet, though, I was confused as to what this program can actually do for the millions of people who are not Kings but go and put their hard-earned money down on the nose of a horse and wind up looking like a different part of its anatomy. I'll share my conclusions at the end of this review: first let's quickly run through the program.

Once you've run the program and read the onscreen instructions you'll be asked the date of the race, the race number, and whether you wish to rate quarter horses or thoroughbreds. Then comes the nitty gritty. You'll be asked to provide the following information:

1) Horse number
2) Distance of his last race
3) Time he ran in his last race
4) Position he finished in his last race.

One quick note: if you don't have a copy of the daily racing form or its equivalent, buy one or don't bother using this program. Only in these type of papers can you obtain this information.

Upon receiving the answers to these questions, the program proceeds to the next screen which will calculate, sort, and display each horse's statistics for a given race. This is the information that all you handicappers were dying to get your hands on to make your millions. If you want, you can even get a hard copy to your printer. From here on, the program repeats for as many races as you require.

As the author states in the manual, "In order for speed to be of value, it must be comparable, at least at the grossest level of past performance." What I think he's trying to say, and what I would certainly say, is don't take the information supplied by this program to the bank. It's just another variable to add to the already confusing list of variables for each horse in each race. When it comes to gambling of any sort, I still believe if you can't afford to lose the money you bet, don't bet it.

High Desert Publishing Company, P.O. Box 36556, Albuquerque, NM 87176. *–Bob Lloret*

BMC COLOR CRT

BMC International
Commodore 64, VIC 20

Does the flicker of the TV screen become an irritation when you use your computer? Have you looked at high quality color monitors and decided your pocketbook couldn't handle prices often greater than that of a color TV? Do you want something with sound that can double as a display for your VCR? The BMC Color CRT Display (Model AU9191U) may be just what you need.

Resolution and color quality compare favorably with displays which cost nearly twice as much and don't have sound capability. I tried it with a music demo that shows off the 64's SID, and the fidelity is remarkable for the size of the speaker. The package comes with two hookup cables. Both cables have two color-coded phono plugs on one end for the studio and composite video signals. On the computer end, one is a 5-pin DIN which fits the Commodore, and the other has two more phono plugs. The cables do not cost extra.

The owner's manual is only five pages, but two of those show the wiring schematic for the machine. The chips appear to be standard rather than house chips, and voltages and color bar signals are noted. Even if you're not brave enough to try to fix it yourself, you can take this schematic to any electronic repair shop and get it fixed in minimal time. The instructions are clear and well-illustrated. (They do not include the information that the red phono plug is for video.)

All the controls are on the front just under the screen, and feature easy-to-use thumbwheel knobs. Available controls are vertical and horizontal hold, brightness, contrast, tint, color, and volume. A red LED indicates whether or not power is on. (This is not necessary because the screen is dark when the computer is on.)

One negative point is that the 13-inch screen is not anti-glare. The case is an attractive beige and weighs about 25 pounds.

If you are choosing between the BMC and Commodore's 1702, I think it's a tossup. If both monitors are the same price, I would prefer the 1702 only if I had a newer Commodore computer which has an 8-pin DIN plug and permits separate signals for chroma and luminance. Separating these signals does give greater clarity. The 1702 does have a composite signal input for older computers or VCRs.

The 1702 has deeper, richer colors, but also less brightness. The controls are behind a flip-up panel and therefore harder to use than the BMC's. My ear isn't good enough to tell which has better sound. The user's manual for the 1702 is much better than BMC's, but it does not include a schematic.

When I went looking for a monitor, two factors made me choose the BMC over the 1702. First, the Commodore monitors are hard to find locally. Most stores seem to have trouble keeping them in stock. Secondly, the 1702s that I could special order were all $30 to $50 more than the price on my BMC. I don't see a significant difference in quality between the two monitors, so I took the one that cost less and was available, and I'm happy with my choice.

–Annette Hinshaw

An open letter to the readers of Ahoy Magazine Vincent Kurek President: The Ennon Corporation

My purpose in writing is to ask you to join me in shaping the future of the new and most unusual field in computer technology today: Artificial Intelligence.

This incredible power and spectacular creative potential are available to you, for your computer right now. However, there is an alarming possibility that such amazing technology which you have every right to, may not be available to you other that through this offer.

This is unfortunate but somewhat understandable due to the way technology is created. You see, only the business oriented corporation can finance research. It therefore is in a position to dictate immediate research goals. These goals are increasing profits through more efficient production. While valid, they are merely creative and do absolutely nothing to foster exploration in new applications. The result: technology is never used to its fullest potential. But what's worst of all is that these competitve corporations have absolutely no desire to share technology with each other, let alone with you. So, they don't. As a result, the infinitesimal amount of technology that finally trickles down to you is:

A. So expensive you are prohibited from procurring it
B. Shamefully inferior to the real thing

remember...you can buy high-tech consumer goods, but never the technology that creates it.

This same situation confronts you in the new Artificial Intelligence field, but with a difference: There is no true Artificial Intelligence for the home computer user! The few programs claiming to be Artificial Intelligence are really simulators. They are not the real thing. Possessing a mere token of the power and versatility, simulators are clearly not worth their expensive price.

I have tried repeatedly to convince my colleagues that it is in their best interest to release genuine Artificial Intelligence to the general public. The refinement, modification and adaptation as individuals create new applications would improve Artificial Intelligence tremendously. This would benefit everyone in the long run.

I have met with little success. Apparently, it seems that immediate corporate profit is more important than sharing technology with the public. Therefore, the Ennon Corporation stands alone in offering superior Artificial Intelligence programming directly to the home computer enthusiast.

Announcing AN-83: The "Thinking" Program

Believe me when I say AN-83 is the real thing. It is a true "thinking" program that receives an initial "knowledge base" from a data file read when AN-83 is started. Using inductive and deductive logical analysis, this amazing program deduces everything from that data and adds it to its memory. Conversing with you, AN-83 adds and combines with facts already known. It generates new conclusions not explicitly contained in its original knowledge base—just like your own thinking process! The result: it knows considerably more than the specific facts given to it.

AN-83 can also think about anything. It is virtually unlimited in its application. Think of your possibilities. The potential is limitless. In the right hands, AN-83 would revolutionize the adventure, strategy and other smart game-playing programs to say nothing of classic arcade games. On the other hand, AN-83 could be one of the most powerful business analysts available to the home computer.

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In addition, you will be receiving free, Eliza—the most amazing conversational A.I. program to date. Run this for your friends and jaws will drop with amazement. Eliza's responses are so human, it's uncanny. An entertaining program, Eliza will answer once and for all the question: What can your computer do?

How to Learn Artificial Intelligence

You can be creative. Experiment and modify to fit your personal use because AN-83 and Eliza both possess source code in basic, the most popular easy to use language for the micro. Their extensive, easy to understand commands walk you through the source code step by step. It's surprisingly simple. Even the beginner can understand the "How and Why of A.I."

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With very best of wishes,

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COMPUTER CALCULATOR
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A friend of mine who does accounting and property management for a living has given up trying to use his computer as a calculator. Taped to his computer, just above the keyboard, is his trusty old scientific calculator, ready at a moment's notice to perform math functions which the computer, but not its software, is readily capable of.

My friend's problem would be solved, in part, by *Computer Calculator.* This program gives you many of the functions of a scientific calculator; it cannot let you perform those functions while you are running another program.

Computer Calculator displays a calculator keyboard on the screen. Along with the numbers and standard arithmetic functions (addition, subtraction, multiplication, division, and exponentiation) are fifteen other keys. Math functions including sine, cosine, tangent, arctangent, logarithm, square root, integer value, absolute value, and pi are all available.

The remaining keys are used to store, exchange, or recall numbers from memory locations (up to ten) and to define or store functions (up to ten). Both memory locations and functions are accessed with the 0 through 9 keys. A feature that would be awfully nice, but is missing, would be to let the user refer to memory locations or functions by name. Long before the time I have twenty numbers and functions stored, I will have to break out pencil and paper to keep them straight.

The I/O section of this program is weak. You can save individual functions to disk and load them back in whenever you want. Here, you do get to label each function with a file name. Unfortunately, there is no way to get a directory of the saved functions and when I guessed incorrectly, the program crashed. Saved functions are not automatically loaded with the program; each function must be individually loaded once *Computer Calculator* is running.

An output feature that most scientific calculators do not provide is a printed tape. *Computer Calculator* follows the model by not providing any way to get a printed record of your calculations.

On the display line of your "on-screen" calculator, you decide what format you want. You can set the number of decimal places to be shown and determine whether extra digits should be rounded or truncated. As you punch numbers or commands on the keyboard, the corresponding keys of the screen's calculator will light up. Everything you type shows on the calculator's display line except functions you are defining and memory locations which appear at the bottom of the screen.

Computer Calculator is a programmed model of a hand-held scientific calculator. Within the limits of Commodore BASIC, calculations are performed easily and accurately. The program does not use the computer's strengths to give you extra features not found in calculators. By shopping around, you may find a calculator with features similar to this program's for about the same price. The question is, do you want to glue it to your computer?

Pioneer Software, #217-620 View Street, Victoria, B.C., Canada V8W 1J6 (phone: 604-381-3211).

–Richard Herring

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en, the program provides eight functions (among them the standard change disk, directory, and quit).

Every database program has its own method of formatting new files. Some are quite bizarre. The "start new file" formatting command in *Inquire Pac* is one of the more straightforward procedures. However, provisions for different types of fields and the ability to include descriptive text were omitted. Additional drawbacks stem from the system specifications of *Inquire Pac*, which permit only 15 fields to a file, 252 characters in a file, and 30 characters in any field that will be sorted.

Directory access, data entry, limited searches, multiple deletion of records, and record renumbering can be performed through the main menu function "maintain file" which is linked to a submenu. Data entry is limited to 200 records, at which point the file is considered "full." The limited searches are single record searches, permitting the recall of individual records either by the first field or record number (records are numbered sequentially as they are recorded). When the record is found, an option to delete it is offered.

The multiple delete function removes groups of sequential records. High and low record numbers are entered to define the range in which records will be deleted. The collect files function operates hand-in-hand with delete records, reassigning record numbers sequentially. For example, if records 2, 3, and 5 are deleted from a file that originally contained six records, collect files would reassign the record numbers so that the last record entered before the alteration (originally #6) would now be #3. In this way, a file space may be increased within the 200-record limit.

The printer format options are adequate; however, they do not allow sufficient flexibility for printing sophisticated reports (or even not-so-sophisticated reports with descriptive text and titles). The printer format function is prompt-driven after selection from the main menu.

Inquire Pac sort and search routines have the same weaknesses as the rest of the program: you can't do much with them. Sorts can only be performed to organize records into alphabetic or numeric order. Searches may be specific or threshold, allowing selection of records with identical fields or the identification of records whose fields fall within a predetermined range. However, it's only possible to sort by one "factor" at a time under *Inquire Pac*.

Inquire Pac's beginner-friendliness is good. Its crippling limitations are bad, and must be remembered before you select this program to fill your database needs.

Pacific Coast Software, 3220 S. Brea Canyon Road, Diamond Bar, CA 91765 (phone: 714-594-8210).

—Rachel Schleimer

JANCE HARD WIRE SECURITY SYSTEM

Jance Associates, Inc.
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We've seen peripherals that will protect your Commodore system from overheating, from power surges, from static buildup. Why not one to protect the whole expensive shtick from being ripped off—along with the rest of your house or apartment?

Jance Associates manufactures two alarm systems that will enable your VIC or 64 to stand vigil over your home. We tested the Jance Hard Wire Alarm System, which required us to run wires from the computer to each door or window to be protected. Also available is a wireless setup which utilizes your home's electrical system.

The Hard Wire system includes a cartridge for interfacing with the computer, 13 magnetic switches for mounting on doors and windows, 2 deactivate buttons, 1 panic button (for remote activation of alarms), 2 alarm bells (one for inside, one for outside), a 12-volt DC power supply, 5 window warning decals, and 200 feet of 22 gauge, twin-conductor stranded wire.

The instructions anticipated, and offered solutions to, nearly all our installation problems. In addition to the printed instructions, there's a program complete with troubleshooting hints, as well as documentation for help in modifying the program to suit your own needs.

The system allows for multiple options on the user's part. Windows can be rigged in parallel wiring (as opposed to serial, like the rest of the system) so they can be left open without setting off the alarm. You may also turn the system on and go out. Upon reentry, a 10-second "warning" beeper will sound prior to the unleashing of both the inner and outer

Continued on page 62

S.O.S.

By David Barron

I am currently working on a program that uses the SID chip to make sounds and music in my program. I am experiencing a most annoying problem. When all of the oscillators should be quiet (the envelopes are finished), there is substantial noise coming from the speaker. It is lower than the volume that the sounds I want come through at, but it still very disturbing. Is there anything that can be done to remedy this situation?

—*Roberto Velez*
Hoboken, NJ

The SID chip has a reputation for being very noisy. Some 64's have what seem to be "supercharged" SID chips that are even noisier than usual. Even when all gates are off and envelope levels should be at zero, sound does leak through. There is one simple way to eliminate this problem. After each oscillator is done producing its desired sound, load its frequency registers with zeroes. This will stop that particular voice from producing any sound, decreasing the amount of background noise. Additionally, when none of the voices are producing any sounds, set the master volume to zero.

A problem I've been having pertains to the drive—certain programs I have work fine for a while, but then problems start. In some instances, my disk drive will simply lock up while accessing the disk, and spin forever. Other times while performing an operation, the disk drive will make noises as though it is initializing a disk. I hear the head banging around inside the drive. I have lost many disks because of this and would like some help. Thank you for your S.O.S. section.

—*Norman L. Thomas*
Yellow Springs, OH

From your description of your problem, I can draw two possible conclusions. Either your drive is in some way defective, or you are experiencing heat-related difficulties. To remedy an overheating problem I recommend that you install a fan on your disk drive. I recommend the same to anyone who uses his or her drive for many continuous hours. A number of companies manufacture fans for the 1541; see the December '84, January '85, and February '85 installments of Scuttlebutt.

No problem is too trivial, none too difficult—almost—to be included in S.O.S. *Send your thorniest to* S.O.S., *c/o* Ahoy!, *Ion International Inc., 45 West 34th St.—Suite 407, New York, NY 10001. Please type if possible.*

HOME BUDGET
BY BRIAN DOBBS FOR THE C-64

Home Budget is a menu-driven program that enables the user to keep records of monthly spending within a household. It is designed to work in conjunction with a disk drive and printer.

Upon running the program, the first thing that comes up is the menu. It lets you choose to:

❶ Write and view data for monthly bills.

❷ View barchart trends of bills for a one-year period.

❸ Receive a printout of all 12 bills for a one-year period.

❹ Load and Save data of bills as a file on disk.

❺ Create an initial file.

The first thing to do is create an initial file. Upon choosing #5, you are asked to fill in 12 bills that are paid on a monthly basis (mortgage, water, etc.). The user will then enter a filename and the program will create a file with the 12 bills and 144 0's (12 bills for 12 months). You now have a file to work with and can update it every month as the bills come in. At this point, you no longer need to create a new file for the data to be entered. You can now simply select "Write monthly bills" for each month that arises. Once you have started filling in data, you can "View monthly bills." When selecting this, all the data for a particular month as well as the monthly total spent will be displayed.

Also, a barchart trend of each bill can be viewed. The chart will cover the entire one-year period. It enables the money-conscious person to view spending trends for each bill. The only requirement is that the user select a maximum scale for the chart. As this can vary from bill to bill, it is left up to the user to enter.

An added feature is the ability to get a printout consisting of the 12 bills for the 12 months. At the bottom, a monthly spending total is supplied. This is handy if a permanent record of the year's spending is required.

As long as an initial file is created, the user has access to a limitless amount of files which can be viewed, written to, and followed by trends.

In these difficult economic times, I've become very conscious of how I spend my money. *Home Budget* has enabled me to monitor my spending and cut down on wastefulness. ☐

SEE PROGRAM LISTING ON PAGE 82

Numerology

for the VIC and 64

By Marilyn Sallee

Numerology is the ancient science of numbers. Since numbers and their handling are at the core of your Commodore (and all computers), it follows that the art of numerology fits right in. Let your Commodore analyze your name and birth date and tell you what attributes these numbers vibrate to. Are you an ambitious number one, or a sensitive number two? What attributes does your nickname have? Does it reinforce your given name, or add other qualities to your image? For serious believers in numerology, each day has its special vibrations. This program will tell you if the date is supposed to be good for financial investments, or better left to a picnic.

Each letter of the alphabet has a corresponding number that it vibrates to. The key number of a name is the vibrating numbers of that name added up and reduced to a single digit. A number larger than nine is similarly reduced to a single digit. And that single digit determines the attributes of the name or date.

Here is the way the program works for the VIC 20:

This program uses up just about all the available memory in the unexpanded VIC. Do not add any extra characters or spaces other than what is indicated or you will get an out of memory message. The data lines, which are the key to the whole program, use up a lot of the memory. Because of this, there are no REM statements to explain what each section does in the program.

Lines 10-20: set up the screen colors and prints the title page, then wait for you to hit a key.

Lines 20-28: act on the choice of name or date.

Lines 30-34: accept a date and check to see if only numbers were typed in.

Line 36: defaults if something other than a number or space was typed.

Lines 38-42: ignore a space, add up the values of the numbers, and then jump to the reducing subroutine.

Lines 44-54: do the same as 30-42 for a name.

Lines 56-62: reducing subroutine to get values to one digit.

Line 64: the default message if an invalid character was encountered.

Lines 66-70: wait for a key subroutine.

Line 72: prints the "vibrates to" message.

Line 74: reads through the data statements to find the set for the proper digit, then displays that set.

Lines 76-80: display the "hit a key" message, wait, and then restore the data and go back to the start.

Lines 82-154: data statements for the outcome.

The C-64 version is very similar, but since there is much more memory, it is amply remarked throughout the program. In addition, the data statements contain much more information about the numbers, and as an added feature, 34-38 were added to make the title page more interesting. □

SEE PROGRAM LISTING ON PAGE 87

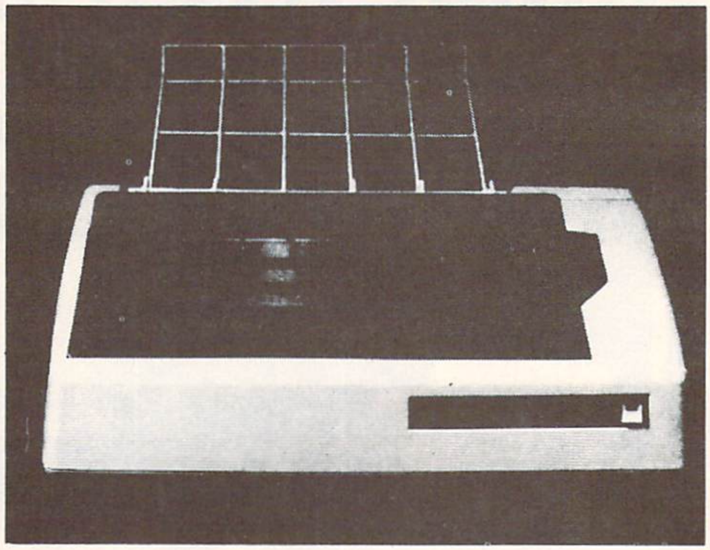
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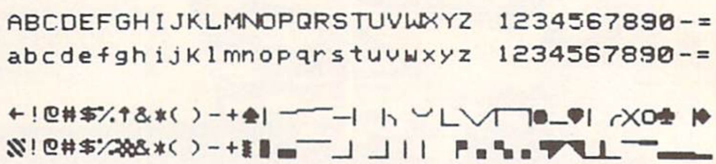
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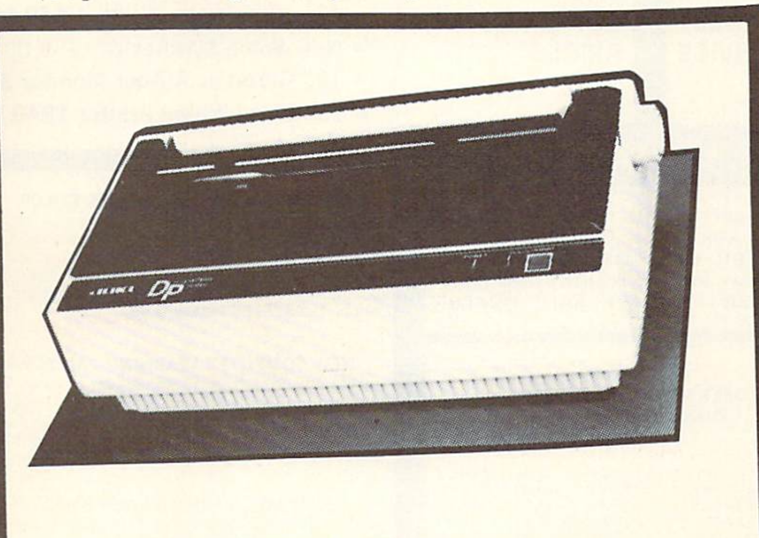
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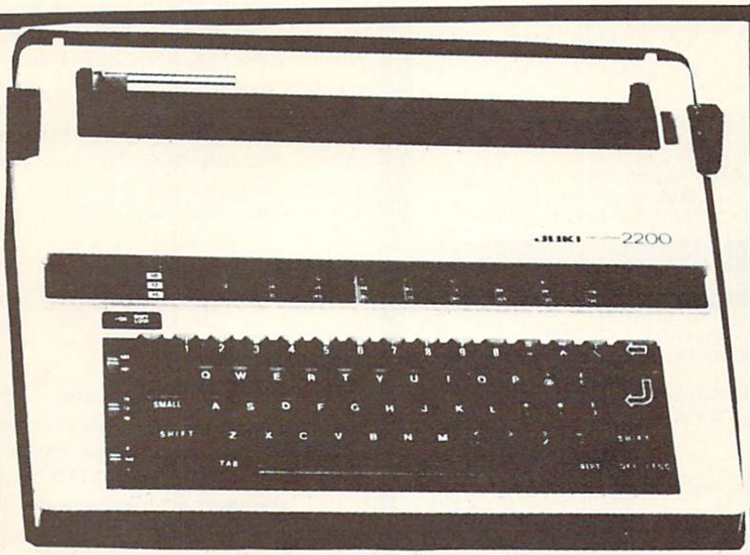
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RUPERT REPORT

What's DOS?

USING AND UNDERSTANDING THE COMMODORE DISK OPERATING SYSTEM

By Dale Rupert

There was a sense of excitement and, no doubt, some apprehension as you connected your Commodore 1541 disk drive for the first time. Plugging in the cable and the power cord was easy enough. No problems turning it on. Maybe even using it for the first time was not much of a challenge, especially if you had a store-bought software package with step-by-step instructions on the cover.

But how about the first time you tried (and repeatedly failed) to save one of your own programs on that unformatted diskette fresh out of the box? Has your heart fully recovered from the time you heard the raucous, self-destruct sounds from the disk drive as you formatted your first disk?

This month we will investigate the capabilities of the Commodore 1541 Disk Operating System. We will also look at the DOS Support Program ("The Wedge"). If you have just begun using the disk drive, this article should help you get off to a good start. If you are already successfully using your disk system, perhaps you will learn a trick or two that you hadn't considered.

The most difficult aspect of learning to use the disk drive is certainly the Commodore P/N 1540031-02, better known as the *VIC-1541 Single Drive Floppy Disk User's Manual.* It is incredible that a discussion of the Block Availability Map (BAM) and pattern matching with Wild Cards should precede even a hint of the concept of formatting a blank disk before attempting to store a program.

Even though I had used floppy disks on other computers for years, I wasn't sure after several moments of reading, rereading, and contemplation whether or not I should remove my first disk from the Commodore drive. The *User's Manual* clearly warned me on page 8 to "Never remove the diskette when the green drive light is on! Data can be destroyed by the drive at this time!" Common sense got the better of me, and I did eventually remove the diskette. Certainly the manual is referring to the red light, not the green one.

Those are enough complaints about the manual. One purpose of this article is to help remedy the *Disk User Manual's* shortcomings. First let's look at some of the basics of disk usage. Then we'll delve further into what a disk operating system is.

GETTING STARTED

Commercially produced software on disks usually has instructions for loading and running the programs. Let's see what it takes to use the disk drive for your own programs. A new disk fresh out of the box must first be "formatted" before it can be used to store information. Some computers require that only special factory-formatted disks be used. Fortunately for our pocketbooks, the Commodore uses "soft-sectored" mini-floppies which we format ourselves. They are readily available from many sources and are much more affordable than pre-formatted disks.

Formatting divides the disk into various regions by putting magnetic markers onto it. These markers allow the computer to keep a record of where the various programs on the disk may be stored so that it can easily locate them later. To format a blank disk, simply insert it into the drive. Then type the following sequence which tells the drive what to do:

```
OPEN 15,8,15,"NEW0:diskname,ID"
```

"Diskname" is an arbitrary name up to 16 characters in length. It is displayed whenever you request a directory listing of the disk. The "ID" is a two-character sequence which is written to each sector on the disk. The sectors are the partitions into which the disk is divided during this formatting process. The computer knows whether or not you have swapped disks since the last disk access only by reading the sector ID bytes. You should use different ID's on each of your disks for that reason.

Keep in mind that executing this NEW disk command will format a blank disk. It will also erase and reformat any other disk. Any information on the disk before formatting is lost. So be certain the disk in the drive is the correct one.

Once a disk is formatted, programs may be stored and retrieved using the following commands:

```
SAVE "progname",8
```

and

```
LOAD "progname",8
```

The "progname" is the name you assign to the program when you save it. It may be up to 16 characters in length. The "8" is the standard device number for the 1541 disk drive. The computer would attempt to access the cassette port if the "8" were not included.

So far, except for the formatting procedure, using the disk drive is not significantly different from using a cassette. Of course, the speed and flexibility of the disk system provide significant advantages over tapes.

Before we go any further, let's look at the biggest help in using the Disk Operating System. It is a program contained on the 1541 Test/Demo disk. Officially it is called the *DOS Manager V5.1,* but it is usually referred to as "The Wedge."

THE WEDGE

The Wedge is a machine language program which is loaded into the computer's memory from the disk. It provides a set of shorthand commands to replace the unwieldy sequence of keystrokes otherwise needed to communicate with the disk drive. For example, the formatting command sequence discussed above is reduced to this once the Wedge has been installed:

```
@N:diskname,ID
```

To save a program to the disk, we need only enter:

```
[left arrow] progname
```

where [left arrow] is the key in the upper left corner of the keyboard. Loading a program is equally easy using this sequence:

```
/ progname
```

Notice that neither quotation marks nor the device number (8) are needed.

Installing the Wedge is quite straightforward. The 1541 Test/Demo disk includes two BASIC programs, *"C-64 Wedge"* and *"VIC 20 Wedge,"* which do all that's necessary. The most obvious way to load the Wedge is this:

```
LOAD "C-64 WEDGE",8 : RUN
```

or

```
LOAD "VIC 20 WEDGE",8 : RUN
```

These BASIC programs put the Wedge into memory. If you list the C-64 version before you run it, you will see that it includes the instruction:

```
LOAD "DOS 5.1" , 8 , 1
```

DOS 5.1 is the name of the Wedge, not the name of the disk operating system. (We will see later that the disk operating system is permanently stored in ROM in the disk drive.) The "1" following the "8" in the instruction above tells the computer that the program to be loaded is a machine language routine, not a BASIC program. The computer then puts this routine into its original location in memory rather than into the normal BASIC program storage area.

Because *DOS 5.1* is loaded with the "1" option, the computer jumps back to the first statement in the loading program. Try this little program on the C-64 with the *1541 Test/Demo* in the drive:

```
10 PRINT A : A = A + 1
20 LOAD "DOS 5.1" , 8 , 1
```

The program loads the Wedge into memory, then returns to the start of the program. This sequence is repeated until you press the RUN/STOP key. You should be able to figure out the reason for the IF-THEN statements in the original Wedge loader program.

Line 10 of the original *C-64 Wedge* program sets A to 1 and loads the Wedge. Program execution returns to line 10 which is now skipped, since A equals 1. Line 20 executes a SYS 52224 which is the starting location of the Wedge.

From this you should see that you can easily create your own *Wedge Loader* program. The first program I load after powering up the C-64 starts with the first two lines of the original *C-64 Wedge* program. Then I include statements which set up the colors on the display, define the printer parameters, and enable repeating keys. This program is saved with the program name "W" so that all I have to do to run it is type:

```
LOAD "W",8 : RUN
```

The program is listed below. You may easily change any of the statements to suit your needs. You may add any other statements as well.

```
5 REM        >>> FILENAME = W  <<<
6 REM MODIFIED WEDGE AND INITIALIZATION
9 REM --- NORMAL WEDGE ---
10 IFA=0 THEN A=1:LOAD"DOS 5.1",8,1
20 IFA=1 THEN SYS12*4096+12*256
30 REM --- INITIALIZATION ---
40 POKE53280,11:POKE53281,12
   :REM BORDER AND BACKGROUND COLORS
50 PRINT CHR$(151):REM  GRAY1 LETTERS
60 POKE 650,128   :REM REPEATING KEYS
100 REM - SET UP MX-80 PRINTER -
110 OPEN 222,4
120 PRINT#222,CHR$(27)"Q"CHR$(40):
CLOSE 222  :REM  40 CHARACTERS PER LINE
200 NEW
```

The POKE value and address to create a repeat function on all keys are listed in the *C-64 Programmer's Reference Guide* on page 317. Evidently the speed and initial

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delay of the repeat is controllable with the values in locations 651 and 652. The default values are satisfactory for my purposes. You might experiment with others.

The following table summarizes the commands provided by the Wedge:

Wedge Command	Direct Mode BASIC Equivalent	
/ filename	LOAD "filename",8	(normal prgm)
% filename	LOAD "filename",8,1	(M.L. prgm)
[up arrow] filename	LOAD "filename",8 : RUN	
[left arrow] filename	SAVE "filename",8	
[left arrow] @0:filename	SAVE "@0:filename",8	(resave, same name)
@ or >	–none–	(display error channel)
@$ or > $	–none–	(display directory)
@C:newfile = oldfile	*PRINT#15,"C:newfile = oldfile"	(Copy)
@I	*PRINT#15,"I"	(Initialize)
@N:diskname,ID	*PRINT#15,"N:diskname,ID"	(format)
@Q	*PRINT#15,"Q"	(Quit Wedge)
@R:newname = oldname	*PRINT#15,"R:newname = oldname"	(Rename)
@S:filename	*PRINT#15,"S:filename"	(Scratch)
@UI	*PRINT#15,"UI"	(reset DOS)
@V	*PRINT#15,"V"	(Validate)

*These statements assume that each PRINT# statement was preceded by a statement such as OPEN 15,8,15 and that it will be followed by the statement CLOSE 15.

Notice for the commands in this table that the "@" and ">" may be used interchangeably.

There are probably only two reasons not to use the Wedge. One is that it may interfere with another program which must be loaded into the same memory locations. (The Wedge resides from locations 52224 to 53082; hexadecimal $C0C0 to $CF5A.) The other reason is that the cassette system does not work properly when the Wedge is in operation. If another program is loaded over the Wedge, the only way to reinstall the Wedge is to reload it.

If you wish to temporarily disable the Wedge so that you may use the cassette system, simply execute the "@Q" or ">Q" command. As long as the program doesn't get overwritten, you may restart the Wedge by typing SYS 52224. Pressing RUN/STOP-RESTORE does not affect the Wedge.

Since the Wedge is a machine language program, it may not be loaded and saved the same way a BASIC program is. One way to transfer the Wedge to other diskettes is to use a monitor program. First load the monitor, then use it to load the Wedge. Finally, put the new disk in the drive and save the Wedge. Generally the monitor requires that you specify a filename and a range of memory which is to be saved onto the new disk. We will see another way to copy the Wedge or any other machine language program in a future column.

The Wedge commands @C, @UI, and @V are probably the least-used. @C allows you to join several files into one, but that is generally not of value. @V must be used with caution. It attempts to reconstruct the pieces of a disk which have been corrupted. A runaway program or a failure to properly close a file are two ways that a disk might become corrupted.

Rather than use @V to fix up a messed-up disk, a safer procedure would be to first copy as many of the important files as possible to another disk, one at a time. Then use @V. It may not save the files which were damaged, but you won't lose any others either. The *1541 User's Manual* warns never to use @V on disks containing random files. Heed the advice.

A possible use for the @UI command is to try to reset the disk drive. Normally if a disk error occurs, the red light on the drive flashes. To turn it off, the best procedure is to simply type @, thereby displaying the error number, error message, and the track and sector where the error occurred. If the @ command failed to work (it never has for me), perhaps the @UI could be tried. This command causes a jump to the Non-Maskable Interrupt vector in the 1541.

One use of the @UI command is to see the version of the Disk Operating System which is contained in the 1541 drive. Enter @UI and then enter @. The screen displays a power up message including "CBM DOS V2.6 1541."

Most of the other Wedge commands should be self-explanatory or at least understandable with the help of the *1541 User's Manual.* Now that we have seen the Wedge commands associated with the Disk Operating System, we have a reasonable idea of the types of things the DOS does.

THE DOS

A disk operating system is a powerful piece of software which allows the user to easily access a floppy disk drive. On the Commodore computers, the disk operating system is more properly called "firmware," since it is stored in ROM rather than on the disk. The Disk Operating System is usually called by its acronym, DOS. Various pronunciations of "DOS" exist, ranging from "doss" to "dawz" to "dose." The first example which rhymes with "boss" is the most common.

The DOS takes care of the details when the computer user wishes to SAVE or LOAD or modify disk files. There are quite a few details. To LOAD a program from disk, the DOS must first check the directory on the disk to find where the program resides. The DOS must generate the sequence of commands for pulsing the stepper motor properly to move the head into position for reading the program. The DOS must interpret the data being read from the disk in order to step its way from sector to sector as it follows the program's trail on the disk. Also, the program must be transferred back to the RAM inside the main computer. Fortunately we merely type LOAD "PRGM",8 (or simply /PRGM) and DOS does the rest.

The hardware in the 1541 disk drive is a computer system in itself. It consists of a 6502 microprocessor, RAM, ROM, and I/O (input/output) devices as well as the drivers, motors, and drive mechanism itself. The microcomputer in the C-64 or the VIC sends the user's commands to the microcomputer in the 1541. The DOS (stored in the ROMs in the 1541) interprets the commands, controls the circuitry to carry them out, and sends the results back to the main microcomputer.

The link between the 1541 disk drive and the main

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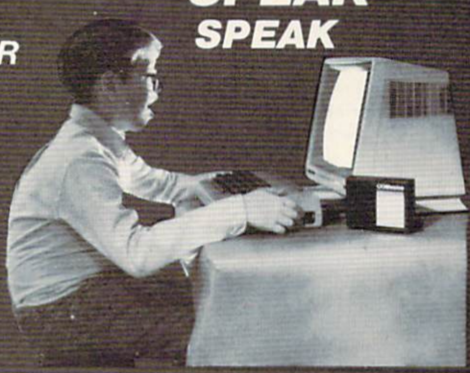
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computer is called a serial channel. Just as you OPEN a file before accessing it, a serial channel must be OPENed before the main computer can communicate with the disk drive. The channels are numbered 0 through 15. Channel numbers 0 and 1 are reserved for the computer to execute the LOAD, SAVE, and VERIFY commands in BASIC. Channel number 15 is the Command Channel. We saw above that many of the Wedge commands are equivalent to accesses to channel 15.

The other channels are available for the programmer to communicate with data files stored on the disk, such as the sequential files we have discussed in previous columns. The channel number is the third argument in the OPEN statement. The statement OPEN 2,8,10,"FILEX, S,W" allocates communications channel 10 to handle data which will be written (W) to a sequential (S) data file named "FILEX" that is to be created on the disk drive (device number 8). The filenumber is 2, so a PRINT#2 statement would be used to write to the file. Notice that the CLOSE 2 statement refers to the filenumber and not the channel number. The channel number is sometimes referred to as the "address" or the "secondary address."

In addition to all of the commands which we have discussed, the DOS provides the capabilities for the programmer to create and manipulate other types of files. Commands may be sent through the command channel to directly access specific sectors on the diskette. The DOS also makes it possible to program your own commands into the RAM of the 1541. If you really want to get into the depths of DOS, you will find the book *Inside Commodore DOS* by Richard Immers and Gerald Neufeld (Datamost) most informative, all 508 pages of it! Obviously we have just scratched the surface here.

We have covered the most frequently used capabilities of the Disk Operating System. Hopefully the distinction between the DOS, the Wedge, and the Wedge loader is clear. If you were already familiar with the Commodore DOS, perhaps this was simply some easy reading. If you are just entering the world of disk-based computing, maybe you will now have an easier initiation than some of us did. ☐

CORRECTION

In the days when men were men and pounded away on hulking Remingtons and Olivettis, this couldn't have happened. But in the course of word processing last issue's **Getting the Words Across: Printer Interfaces for the Commodore Computers,** *Morton Kevelson accidentally deleted the paragraph detailing the operating characteristics of the Gemini 10X printer. The following information should have appeared under heading 4, on page 105, directly before the similar information for the C Itoh 8510:*

The Star Micronics Gemini 10X also prints 480 dots on an eight inch line. It can also print 960 and 1920 dots per line in its high density modes. A Gemini 10X standard Pica character is printed using nine by nine dot matrix. The resulting character only occupies six of the line's 480 dot positions due to use of the printer's high density capabilities. To produce proper 1525 emulation with the Gemini 10X, the interface must generate the Commodore graphics characters in a six dot wide pattern.

ELFRED

by David and Janet Arnold

Your child will love helping Elfred the Elf pack Santa's bag–one with his own name on it! This program for the Commodore 64 will be especially fun to play during the holidays, but children will enjoy it at other times, too. They will find its theme and the colorful sprite graphics appealing. Because of its variable speeds, *Elfred* is suitable for preschoolers as well as for older children.

Elfred takes advantage of the 64's multicolor sprite capabilities. All eight sprites–the maximum allowed at one time–are on the screen, although those eight sprites appear in various forms by drawing from 12 different areas of data.

The child chooses five gifts that he would like to pack into Santa's bag. By hitting the space bar as one of his choices travels down the conveyor belt, he can cause the toy to drop into the bag–or to the ground.

HOW IT PLAYS

After the title screen appears and a Christmas tune plays, the computer begins READing the sprite data which starts at line 460. We included a zero at the end of each data block because although a sprite uses 63 pieces of data, it occupies a memory area of 64 bytes. The extra zero fills in the gap, enabling the computer to POKE continuous blocks of memory without a new loop.

Line 20 READs the data for a tree overlay and for three elf positions. All four of these sprite pictures are POKEd into some empty space in the cassette buffer. The toys will pass behind the piece of Christmas tree because the tree overlay sprite is sprite 0, which has precedence over the other sprites.

Once the elf data is read, Elfred appears and the computer READs the remaining data, which is for the eight gifts. This data is POKEd into some unused screen memory. We have Elfred appear here to surprise the children and to break up the wait.

Elfred next asks the child to decide how many bags to pack and to assign a name to each. This way, the child can pack bags for his friends as well as for himself. Just before this, in line 40, the keyboard buffer is cleared with POKE 198,0. This eliminates anything stored in the buffer by impatient children tapping on the keyboard while the data is loaded. The names must be no more than nine letters long to fit on Santa's bag, so line 60 reduces the INPUT to nine characters if necessary.

A range of 0-9 is available for speed. A zero is for very tiny tots. Our five-year-old uses 4; our seven-year-old does very well with 6. We use a GET here to make it easier for the kids, then add a one to give SP a value (lines 70-80). This is used in line 245 as a STEP in the loop that moves the toys across the conveyor belt. We GET SP$, rather than SP, so that if a letter is accidentally hit, it will not result in a "type mismatch" error statement appearing on the screen.

For the rest of the game, the only key the child has to hit is the space bar. At appropriate times, the computer PEEKs location 197 to see the current key being pressed. If PEEK(197)=60, it is the space bar.

The child will view a rotating display of eight gifts. He will hit the space bar if he wants the gift appearing on the conveyor belt, which will then be displayed in one of the five boxes printed across the top of the screen. These boxes will remain throughout the game to tell the child what gifts must be packed. The toys are assigned the variables G(1) to G(5).

The screen display is PRINTed in lines 85-190. By having the conveyor belt pass behind the Christmas tree, we avoided worrying about the MSB–Most Significant Bit–and added considerable visual interest as well. The five chosen gifts displayed across the top of the screen are also to the left of that point, leaving room for the speed and the score.

The game actually begins at line 200 as the toys randomly move down the conveyor belt. Lines 270-280 turn the elf's head by POKEing sprite 1 (location 2041) with 13, 14, or 15, the three spots in the unused cassette buffer area where we POKEd elf data.

Line 295 changes M to M+1. M is a variable that serves as a flag to the computer to send one of the five chosen toys down the belt (lines 305-310). Otherwise, there would sometimes be seemingly interminable waits.

When the space bar is hit, the toy falls down from the conveyor belt. Lines 315-360 check if the gift is positioned over the bag and, if it is, determine if it was chosen but not yet packed. A perfect score is 0 misses. A gift is counted as a miss if it is a chosen toy that is allowed to pass behind the tree, a chosen toy that has already been packed once, any toy dropped at the wrong time, or an unpicked gift that is dropped into the bag.

When each bag is packed the tune plays again. Line 430 sets the duration of each note with the variable D. We sped up the tempo by multiplying D by 1.5.

Following is a program description:

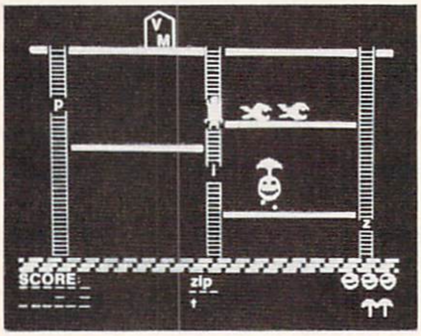
10- 35	Setup	400-415	Reward for correct drop
40- 80	Choose number of bags, names, and speed	420-430	Play tune
80	Begin loop for each bag	435-455	Music data
85- 95	Print gift boxes	460-470	Tree overlay
100-125	Print window and word balloon	475-490	Elf (looking left) data
130-170	Print conveyor belt and tree	495-510	Elf (looking front) data
175-185	Print bag	515-530	Elf (looking right) data
190	Print speed and misses	535-545	Giraffe data
195-305	Move toys on belt	550-560	Doll data
310-360	Drop toys	565-575	Soccer ball data
365-375	Play again option	580-590	Spaceship data
380-395	Sprite colors	595-605	Sailboat data
		610-620	Rubber ducky data
		625-640	Book data
		645-655	Octopus data

SEE PROGRAM LISTING ON PAGE 84

SCUTTLEBUTT

Continued from page 12

grams from Simon & Schuster scheduled for spring '85 release (each $39.95):



Boppie's Great Word Chase *by DLM.*
READER SERVICE NO. 273

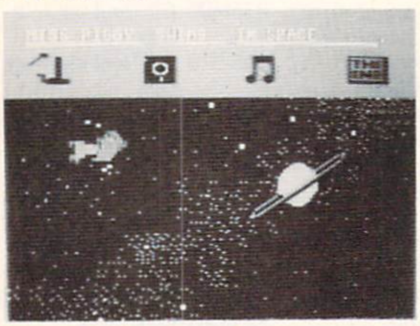
The Great Gonzo in Wordrider requires children aged five and up to combine adjectives and nouns into vehicles that will help Gonzo rescue his beloved Camilla the Chicken from the Swedish Chef.

Kermit's Electronic Storymaker has the Muppets acting out sentences which children aged 4 and up create by filling in blanks that change the subject, action, and place.

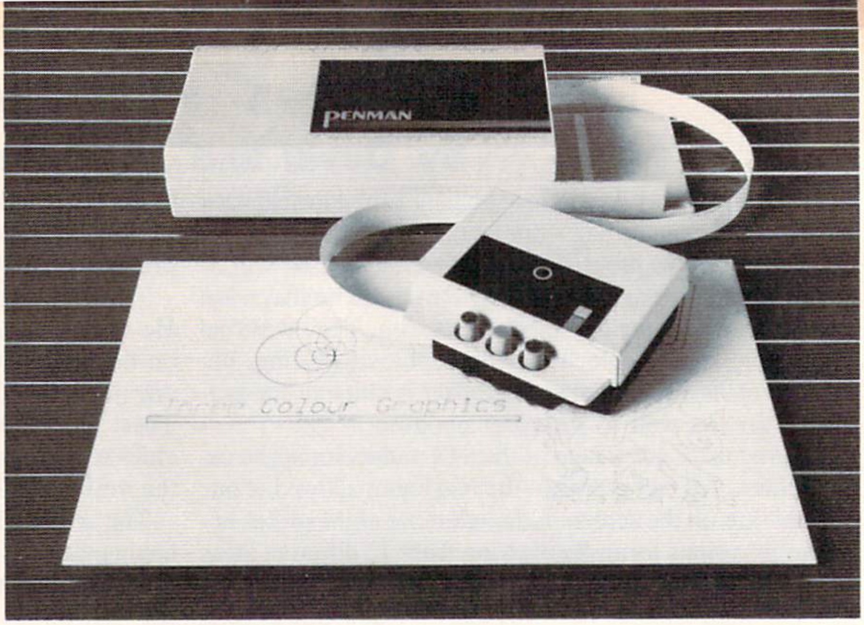
Simon & Schuster Electronic Publishing Group, Simon & Schuster Building, 1230 Avenue of the Americas, New York, NY 10020 (phone: 212-245-6400).

Our predilection for nautical titles makes it a must that we report on three new releases from Schooner Software: *Sounds Ahoy* (phonics skills), *Captain Bub-Dub* (letter recognition), and *Math Splash* (basic multiplication).

Schooner Software, Dept. P, Box 2145, New Westminster, B.C. V3L 5A3 Canada.



Kermit's Electronic Storymaker.
READER SERVICE NO. 274



The Penman robot plotter produces text and graphics in three colors.
READER SERVICE NO. 275

ROBOT PLOTTER

The Penman robot plotter will align itself with the edges of any piece of paper up to 3' by 3' in size, then wheel around the surface producing multicolor graphics and text as small as 1 millimeter in height. Color is provided by three pens, available in various colors and weights. The unit, which plugs into any RS232 port, retails for $399.00.

Axiom, 1014 Griswold Avenue, San Fernando, CA 91340 (phone: 818-365-9521).

START SMART

Smart Start automatically generates BASIC code to allow the beginning C-64 user to design and save programs consisting of pictures, music, and sound effects. Price is $39.95, which includes (for a limited time) a free BASF floppy disk.

Muse Software, 347 N. Charles St., Baltimore, MD 21201 (phone: 301-659-7212).

INCREASED SPEED, STORAGE

The *Mach 4* disk for the C-64 consists of three enhancement utilities: *Fast Loader* (load files 4 times faster than under normal 1541 operation), *BASIC +4K* (increases programming workspace from 39 to 43K), and *Directory Manager* (creates a data disk containing directory information from the user's entire disk library). Retail price: $24.95.

Access Software, 925 East 900 South, Salt Lake City, UT 84105 (phone: 801-532-1134).

GRAPHICS PROGRAMS

Three new graphics packages for the C-64:

The *Perspectives* animation program allows you to draw and manipulate 3D objects. In Film Studio mode you can save a screen, change it slightly, save the change, and so on, until you have a sequence of files that will simulate a movie when run.

Perspectives, Pioneer Software Inc., 1112 Fort Street, Victoria, B.C., Canada VBV 4V2 (phone: 604-381-3211).

Spritemaster II, an enhancement of Access Software's sprite animation utility, includes color change and interchange, vertical and horizontal translation, eight simultaneous animations, data statement generation, and auto append. Price: $24.95.

Access Software, 925 East 900 South, Salt Lake City, UT 84105 (phone: 801-532-1134).

Imagination will let the user create backgrounds, graphics, and sprites without prior programming knowledge. Retail price: $49.95.

Handic Software, Inc., 520 Fellowship Road, Suite B206, Mount Laurel, NJ 08054 (phone: 609-866-1001).

TAX PREPARATION

It's that time of year when your 64,

VIC, or Plus/4 can really earn its keep, giving you the money required to send your taxes to an accountant or the time and aggravation required to do them yourselves.

The 1985 version (for the 1984 tax year) of *The Tax Advantage*, for use with a C-64 and forms 1040, 6251, 2106, 2441, 4562, and schedules A-E, G, SE, and W, will income average, itemize wages, deductions, and assets, and compute the new alternate "minimum tax." The $69.95 program also enables the user to print directly on any of the above-named forms (except the 1040).

Arrays, Inc./Continental Software, 11223 South Hindry Avenue, Los Angeles, CA 90045 (phone: 213-410-3977).

MicroLab annouunces that their *Tax Manager 1985* will come available for the C-64 this year, at a price of $75.00.

MicroLab, 2699 Skokie Valley Road, Highland Park, IL 60035 (phone: 312-433-7550).

Taxaid, previously (and still) available for the 64 and VIC, has been released in a Plus/4 incarnation which, in addition to preparing IRS form 1040, features computer-generated forms for schedules A, B, C, G, and W, and form 2441.

Plus/4, C-64, or VIC 20 (+16K) version, $29.95; simplified version for unexpanded VIC 20, $24.95. (All available on disk or tape.)

Taxaid Software, Inc., 606 Second Avenue SE, Two Harbors, MN 55616 (phone: 218-834-5012 or 3600).

MODEM WITH TERMINAL PROGRAM

Cardco's MOD-1 modem, designed to emulate the Commodore 1650, adds a terminal program on disk that includes up/downloading of text and program files, phone number and security/access code storage, online printing, and a 30K buffer. Also on the disk are utilities allowing conversion from or to ASCII, CBM ASCII, and *Write Now!* files, and sending and receiving hi-res pictures created with Cardco's *Paint Now!/Graph Now!* or *Video Digitizer*.

Cardco, Inc., 300 S. Topeka, Wichita, KS 67202 (phone: 316-267-3807).

NUTRITION AND DIETING

Two C-64 programs for eaters: *28 Day Dieter* provides you with a choice of calorie level, 28 days of menus, 65 recipes (adjustable for number of servings), and ingredient lists for shopping convenience. *28 Day Diabetic Dieter* offers the same features, with the addition of three distribution levels for each calorie level. Each program retails for $49.95.

Festive Fare, P.O. Box 6447, Grand Rapids, MI 49506.

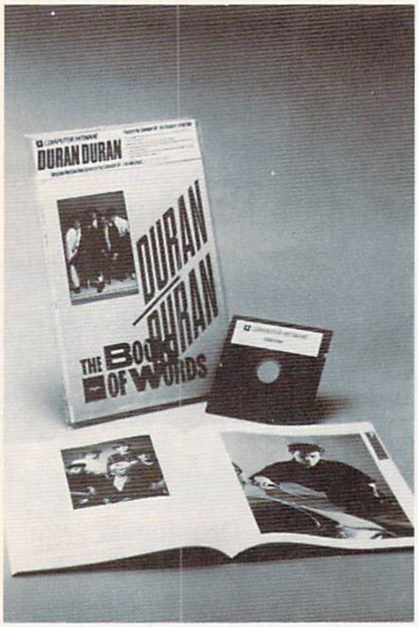
Food Facts offers five educational programs for junior high through adult level: *Cereals*, *Food Graphs*, *Fast Foods*, *Chemicals in Foods*, and *Vitamins*. Included is a 58-page support manual with handouts for each program.

MECC, 3490 Lexington Avenue North, St. Paul, MN 55112 (phone: 612-481-3500).

MUSIC VIDEO MAKERS

Sight & Sound's *Music Video Kit* lets the user create characters, colors, and patterns, and animate them against backgrounds also of his own

creation; or, if he wishes, manipulate a range of preprogrammed musicians, break dancers, and other characters against a dozen different backgrounds. Soundtrack can be created with the polyphonic synthesizer included in the program, or one of a number of included songs.



Create videos with Computer Hitware.
READER SERVICE NO. 278

Also from Sight & Sound comes *3001 Sound Odyssey*, a 150-screen tutorial on music synthesis covering such topics as ADSR, waveforms, filters, and ring modulation. Included is the Microsynth synthesizer which can record and play back songs and rhythm patterns. Price: $39.95.

Sight & Sound Music Software, Inc., 3200 South 166th St., New Berlin, WI 53151 (phone: 414-784-5850).

Three from Passport Music Software: *Macmusic* ($49.95), a composing program that uses a visually oriented user interface; *Computer Hitware*, a computerized rock video program that lets you add your own graphics to a variety of pop songs ($19.95); and *Soundchaser 64* ($199.00), a keyboard for use with the above software, as well as the included software that lets the user create a variety of instrumental sounds.

Passport Music Software, 625 Miramontes Street, Suite 103, Half Moon Bay, CA 94019 (phone: 415-726-0280).

BOOK REVIEW

THE COMMODORE 64 IDEA BOOK by David Ahl (Creative Computing Press, 1983; $8.95). 140 pages, softbound.

An excellent sourcebook for using computer math to solve problems, *The Commodore 64 Idea Book* includes 50 programs that exemplify such ideas as math drill, problem solving, convergence, recursion, and probability. The author says the book is meant to be read with a working computer at hand, and the programs are short enough to enter in a few minutes. Although the title specifies the Commodore 64, most of the programs will work without modification on the other Commodore computers. Those which do not use random numbers will work on many other computers as well.

The book is targeted for educational use, with each program including a discussion of the problem addressed, a program listing, and a sample run of the program. The author seems to assume the presence of a teacher, because he does not include instructions on keying in programs or detailed explanations of either the math or the program code. A person with little math background or a beginning programmer might have trouble with the book unless he had help. For classroom use, however, the book provides a good range of computer problem solving in a form that students are likely to enjoy.

The lone user needs a good math background to understand what is going on in the program. This may be intimidating to some readers. However, anyone with aspirations to being an expert programmer needs to learn the mechanisms Ahl illustrates. Simulations and problem solving software require these ideas. Ahl breaks them into short programs which are as easy to understand as these ideas get.

The program lists are reduced from a dot-matrix printout. The author chose to use lower case, which is hard to read in the tiny letters. The printer does not have true descenders, so g's and 9's look a lot alike. More readable program listings would improve the book.

Illustrations include flow charts, diagrams of problems, and cartoons. All are excellent.

If you are mathematical, this book will be a joy for you. If you want to do application programming, this book is a good source for major programming ideas. If you teach computer math, this book outshines many duller textbooks both in fun and effectiveness.

—Annette Hinshaw

REVIEWS

Continued from page 41

alarms, allowing you time to reach one of the deactivate buttons (assuming that you positioned the button near the door). Function switches on the VIC and 64 can also be used for activating, deactivating, and testing the alarm, which could be heard quite well a block away.

Numerous options are available, including additional window and door switches, a program that automatically dials up to 100 phone numbers and rings an alarm over the phone, and motion and vibration detectors, as well as programs that will turn lights on and off and raise and lower your heat and hot water temperature.

The one drawback of the Jance system is that you can't use your computer for any other purpose while it's on. But considering the price of a full-fledged security system, you'll come out ahead even if you have to purchase a VIC and datasette specifically for this purpose.

Jance Associates, Inc., P.O. Box 234, East Texas, PA 28046 (phone: 215-398-0434).

—Jon Donovan and Ben Vecchio

PROGRAM LISTINGS

Attention new *Ahoy!* readers! You must read the following information very carefully prior to typing in programs listed in *Ahoy!* Certain Commodore characters, commands, and strings of characters and commands will appear in a special format. Follow the instructions and listing guide on this page.

On the following pages you'll find several programs that you can enter on your Commodore computer. But before doing so, read this entire page carefully.

To insure clear reproductions, *Ahoy!*'s program listings are generated on a daisy wheel printer, incapable of printing the commands and graphic characters used in Commodore programs. These are therefore represented by various codes enclosed in brackets [ ]. For example: the SHIFT CLR/HOME command is represented onscreen by a heart. The code we use in our listings is [CLEAR]. The chart below lists all such codes which you'll encounter in our listings, except for one other special case.

The other special case is the COMMODORE and SHIFT characters. On the front of most keys are two symbols. The symbol on the left is obtained by pressing that key while holding down the COMMODORE key; the symbol on the right, by pressing that key while holding down the SHIFT key. COMMODORE and SHIFT characters are represented in our listings by a lower-case "s" or "c" followed by the symbol of the key you must hit. COMMODORE J, for example, is represented by [c J], and SHIFT J by [s J].

Additionally, any character that occurs more than two times in a row will be displayed by a coded listing. For example, [3 "[LEFT]"] would be 3 CuRSoR left commands in a row, [5 "[s EP]"] would be 5 SHIFTed English Pounds, and so on. Multiple blank spaces will be noted in similar fashion: 22 spaces, for example, as [22 " "].

Sometimes you'll find a program line that's too long for the computer to accept (C-64 lines are a maximum of 80 characters, or 2 screen lines, long; VIC 20 lines, a maximum of 88 characters, or 4 screen lines). To enter these lines, refer to the *BASIC Command Abbreviations Appendix* in your User Manual.

On the next page you'll find our *Bug Repellent* programs for the VIC 20 and C-64. The version appropriate for your machine will help you proofread our programs after you type them. (Please note: the *Bug Repellent* line codes that follow each program line, in the whited-out area, should *not* be typed in. See the instructions preceding each program.) □

When You See	It Means	You Type		You Will See
[CLEAR]	Screen Clear	SHIFT	CLR/HOME	
[HOME]	Home		CLR/HOME	
[UP]	Cursor Up	SHIFT	↑ CRSR ↓	
[DOWN]	Cursor Down		↑ CRSR ↓	
[LEFT]	Cursor Left	SHIFT	←CRSR→	
[RIGHT]	Cursor Right		←CRSR→	
[SS]	Shifted Space	SHIFT	Space	
[INSERT]	Insert	SHIFT	INST/DEL	
[DEL]	Delete		INST/DEL	
[RVSON]	Reverse On	CNTRL	9	
[RVSOFF]	Reverse Off	CNTRL	0	
[UPARROW]	Up Arrow		↑	
[BACKARROW]	Back Arrow		←	
[PI]	PI		π	
[EP]	English Pound		£	

When You See	It Means	You Type		You Will See
[BLACK]	Black	CNTRL	1	
[WHITE]	White	CNTRL	2	
[RED]	Red	CNTRL	3	
[CYAN]	Cyan	CNTRL	4	
[PURPLE]	Purple	CNTRL	5	
[GREEN]	Green	CNTRL	6	
[BLUE]	Blue	CNTRL	7	
[YELLOW]	Yellow	CNTRL	8	
[F1]	Function 1		F1	
[F2]	Function 2	SHIFT	F1	
[F3]	Function 3		F3	
[F4]	Function 4	SHIFT	F3	
[F5]	Function 5		F5	
[F6]	Function 6	SHIFT	F5	
[F7]	Function 7		F7	
[F8]	Function 8	SHIFT	F7	

BUG REPELLENT

This program will let you debug any *Ahoy!* program. Follow instructions for VIC 20 (cassette or disk) or C-64.

VIC 20 VERSION

By Michael Kleinert and David Barron

For cassette: type in and save the *Bug Repellent* program, then type RUN 63000[RETURN]SYS 828[RETURN]. If you typed the program properly, it will generate a set of two-letter line codes that will match those listed to the right of the respective program lines.

Once you've got a working *Bug Repellent*, type in the program you wish to check. Save it and type the RUN and SYS commands listed above once again, then compare the line codes generated to those listed in the magazine. If you spot a discrepancy, a typing error exists in that line. Important: you must use exactly the same spacing as the program in the magazine. Due to memory limitations on the VIC, the VIC *Bug Repellent* will register an error if your spacing varies from what's printed.

You may type SYS 828 as many times as you wish, but if you use the cassette for anything, type RUN 63000 to restore the *Repellent*.

When your program has been disinfected you may delete all lines from 63000 on. (Be sure the program you type doesn't include lines above 63000!)

For disk: enter *Bug Repellent*, save it, and type RUN:NEW [RETURN]. Type in the program you wish to check, then SYS 828.

To pause the line codes listing, press SHIFT.

To send the list to the printer type OPEN 4,4:CMD 4:SYS 828[RETURN]. When the cursor comes back, type PRINT#4:CLOSE 4[RETURN].

```
•63000 FORX=828TO1023:READY:POKEX,Y:NEXT:END   AC
•63001 DATA169,0,133,63,133,64,165,43,133,251  JL
•63002 DATA165,44,133,252,160,0,132,254,32,228 DF
•63003 DATA3,234,177,251,208,3,76,208,3,230    OE
•63004 DATA251,208,2,230,252,169,244,160,3,32  OH
•63005 DATA30,203,160,0,177,251,170,230,251,20
 8                                             KO
•63006 DATA2,230,252,177,251,32,205,221,169,58 JJ
•63007 DATA32,210,255,169,0,133,253,230,254,32 OK
•63008 DATA228,3,234,165,253,160,0,170,177,251 LG
•63009 DATA201,32,240,6,138,113,251,69,254,170 BP
•63010 DATA138,133,253,177,251,208,226,165,253
 ,41                                           DD
•63011 DATA240,74,74,74,74,24,105,65,32,210    EK
•63012 DATA255,165,253,41,15,24,105,65,32,210  FO
•63013 DATA255,169,13,32,210,255,173,141,2,41  PK
•63014 DATA1,208,249,230,63,208,2,230,64,230   CB
•63015 DATA251,208,2,230,252,76,74,3,169,236   KH
•63016 DATA160,3,32,30,203,166,63,165,64,32    DP
•63017 DATA205,221,169,13,32,210,255,96,230,25
 1                                             EL
•63018 DATA208,2,230,252,96,0,76,73,78,69      OI
•63019 DATA83,58,32,0,76,73,78,69,32,35        FG
•63020 DATA32,0,0,0,0,0                        LE
```

C-64 VERSION

By Michael Kleinert and David Barron

Type in, SAVE, and RUN the *Bug Repellent*. Type NEW, then type in or LOAD the *Ahoy!* program you wish to check. When that's done, SAVE your program (don't RUN it!) and type SYS 49152 [RETURN].

To pause the listing depress and hold the SHIFT key.

Compare the codes your machine generates to the codes listed to the right of the respective program lines. If you spot a difference, an error exists in that line. Jot down the number of lines where contradictions occur. LIST each line, spot the errors, and correct them.

```
•5000 FORX=49152TO49488:READY:POKEX,Y:NEXT:END GJ
•5001 DATA32,161,192,165,43,133,251,165,44,133 DL
•5002 DATA252,160,0,132,254,32,37,193,234,177  DB
•5003 DATA251,208,3,76,138,192,230,251,208,2   OF
•5004 DATA230,252,76,43,192,76,73,78,69,32     KN
•5005 DATA35,32,0,169,35,160,192,32,30,171     CA
•5006 DATA160,0,177,251,170,230,251,208,2,230  CE
•5007 DATA252,177,251,32,205,189,169,58,32,210 JE
•5008 DATA255,169,0,133,253,230,254,32,37,193  CL
•5009 DATA234,165,253,160,0,76,13,193,133,253  NB
•5010 DATA177,251,208,237,165,253,41,240,74,74 MB
•5011 DATA74,74,24,105,65,32,210,255,165,253   EP
•5012 DATA41,15,24,105,65,32,210,255,169,13    GH
•5013 DATA32,220,192,230,63,208,2,230,64,230   AN
•5014 DATA251,208,2,230,252,76,11,192,169,153  NG
•5015 DATA160,192,32,30,171,166,63,165,64,76   BF
•5016 DATA231,192,96,76,73,78,69,83,58,32      EP
•5017 DATA0,169,247,160,192,32,30,171,169,3    PJ
•5018 DATA133,254,32,228,255,201,83,240,6,201  FK
•5019 DATA80,208,245,230,254,32,210,255,169,4  FL
•5020 DATA166,254,160,255,32,186,255,169,0,133 CL
•5021 DATA63,133,64,133,2,32,189,255,32,192    GC
•5022 DATA255,166,254,32,201,255,76,73,193,96  NN
•5023 DATA32,210,255,173,141,2,41,1,208,249    NH
•5024 DATA96,32,205,189,169,13,32,210,255,32   IM
•5025 DATA204,255,169,4,76,195,255,147,83,67   KC
•5026 DATA82,69,69,78,32,79,82,32,80,82        DC
•5027 DATA73,78,84,69,82,32,63,32,0,76         ML
•5028 DATA44,193,234,177,251,201,32,240,6,138  GN
•5029 DATA113,251,69,254,170,138,76,88,192,0   JK
•5030 DATA0,0,0,230,251,208,2,230,252,96       NA
•5031 DATA170,177,251,201,34,208,6,165,2,73    DM
•5032 DATA255,133,2,165,2,208,218,177,251,201  JA
•5033 DATA32,208,212,198,254,76,29,193,0,169   FM
•5034 DATA13,76,210,255,0,0,0                  PA
```

FLANKSPEED FOR THE C-64

By Gordon F. Wheat

Flankspeed will allow you to enter machine language *Ahoy!* programs without any mistakes. Once you have typed the program in, save it for future use. While entering an ML program with *Flankspeed* there is no need to enter spaces or hit the carriage return. This is all done automatically. If you make an error in a line a bell will ring and you will be asked to enter it again. To LOAD in a program Saved with *Flankspeed* use LOAD "name",1,1 for tape, or LOAD "name",8,1 for disk. The function keys may be used after the starting and ending addresses have been entered.

f1–SAVEs what you have entered so far.

f3–LOADs in a program worked on previously.

f5–To continue on a line you stopped on after LOADing in the previously saved work.

f7–Scans through the program to locate a particular line, or to find out where you stopped the last time you entered the program. f7 temporarily freezes the output as well.

```
•5 POKE53280,12:POKE53281,11                   LL
•6 PRINT"[CLEAR][c 8][RVSON][15" "]FLANKSPEED[
 15" "]";                                      ED
•10 PRINT"[RVSON][5" "]MISTAKEPROOF ML ENTRY P
 ROGRAM[6" "]"                                 MC
•15 PRINT"[RVSON][9" "]CREATED BY G. F. WHEAT[
 9" "]"                                        DM
•20 PRINT"[RVSON][3" "]COPR. 1984, ION INTERNA
```

```
TIONAL INC.[3" "]"                                  DH
·30 FORA=54272TO54296:POKEA,0:NEXT                  IM
·40 POKE54272,4:POKE54273,48:POKE54277,0:POKE5
4278,249:POKE54296,15                               NH
·70 FORA=680TO699:READB:POKEA,B:NEXT                KO
·75 DATA169,251,166,253,164,254,32,216,255,96       HJ
·76 DATA169,0,166,251,164,252,32,213,255,96         JB
·80 B$="STARTING ADDRESS IN HEX":GOSUB2010:AD=
B:SR=B                                              HC
·85 GOSUB2520:IFB=0THEN80                           FO
·86 POKE251,T(4)+T(3)*16:POKE252,T(2)+T(1)*16       KE
·90 B$="ENDING ADDRESS IN HEX":GOSUB2010:EN=B       IF
·95 GOSUB2510:IFB=0THEN80                           FP
·96 POKE254,T(2)+T(1)*16:B=T(4)+1+T(3)*16           MN
·97 IFB>255THENB=B-255:POKE254,PEEK(254)+1          GE
·98 POKE253,B:PRINT                                 HN
·100 REM  GET HEX LINE                              IL
·110 GOSUB3010:PRINT": [c P][LEFT]";:FORA=0TO8      FG
·120 FORB=0TO1:GOTO210                              MD
·125 NEXTB                                          ME
·130 A%(A)=T(1)+T(0)*16:IFAD+A-1=ENTHEN310          LH
·135 PRINT" [c P][LEFT]";                           IK
·140 NEXTA:T=AD-(INT(AD/256)*256):PRINT" "          PD
·150 FORA=0TO7:T=T+A%(A):IFT>255THENT=T-255         LK
·160 NEXT                                           IA
·170 IFA%(8)<>TTHENGOSUB1010:GOTO110                FK
·180 FORA=0TO7:POKEAD+A,A%(A):NEXT:AD=AD+8:GOT
0110                                                MN
·200 REM    GET HEX INPUT                           AB
·210 GETA$:IFA$=""THEN210                           HO
·211 IFA$=CHR$(20)THEN270                           GC
·212 IFA$=CHR$(133)THEN4000                         MD
·213 IFA$=CHR$(134)THEN4100                         KF
·214 IFA$=CHR$(135)THENPRINT" ":GOTO4500            GE
·215 IFA$=CHR$(136)THENPRINT" ":GOTO4700            BJ
·220 IFA$>"@"ANDA$<"G"THENT(B)=ASC(A$)-55:GOTO
250                                                 GM
·230 IFA$>"/"ANDA$<":"THENT(B)=ASC(A$)-48:GOTO
250                                                 LE
·240 GOSUB1100:GOTO210                              LL
·250 PRINTA$"[c P][LEFT]";                          OA
·260 GOTO125                                        CG
·270 IFA>0THEN280                                   OP
·272 A=-1:IFB=1THEN290                              OB
·274 GOTO140                                        CJ
·280 IFB=0THENPRINTCHR$(20);CHR$(20);:A=A-1         HG
·285 A=A-1                                          BE
·290 PRINTCHR$(20);:GOTO140                         KH
·300 REM LAST LINE                                  AD
·310 PRINT" ":T=AD-(INT(AD/256)*256)                GJ
·320 FORB=0TOA-1:T=T+A%(B):IFT>255THENT=T-255       PL
·330 NEXT                                           IA
·340 IFA%(A)<>TTHENGOSUB1010:GOTO110                KF
·350 FORB=0TOA-1:POKEAD+B,A%(B):NEXT                HN
·360 PRINT:PRINT"YOU ARE FINISHED!":GOTO4000        ON
·1000 REM BELL AND ERROR MESSAGES                   FL
·1010 PRINT:PRINT"LINE ENTERED INCORRECTLY":PR
INT:GOTO1100                                        DH
·1020 PRINT:PRINT"INPUT A 4 DIGIT HEX VALUE!":
GOTO1100                                            JA
·1030 PRINT:PRINT"ENDING IS LESS THAN STARTING
!":B=0:GOTO1100                                     HD
·1040 PRINT:PRINT"ADDRESS NOT WITHIN SPECIFIED
 RANGE!":B=0:GOTO1100                               AG
·1050 PRINT:PRINT"NOT ZERO PAGE OR ROM!":B=0:G
OTO1100                                             KN
```

```
·1060 PRINT"?ERROR IN SAVE":GOTO1100                EI
·1070 PRINT"?ERROR IN LOAD":GOTO1100                GL
·1080 PRINT:PRINT:PRINT"END OF ML AREA":PRINT       PG
·1100 POKE54276,17:POKE54276,16:RETURN              BH
·1200 OPEN15,8,15:INPUT#15,A,A$:CLOSE15:PRINTA
$:RETURN                                            IM
·2000 REM GET FOUR DIGIT HEX                        PC
·2010 PRINT:PRINTB$;:INPUTT$                        GM
·2020 IFLEN(T$)<>4THENGOSUB1020:GOTO2010            II
·2040 FORA=1TO4:A$=MID$(T$,A,1):GOSUB2060:IFT(
A)=16THENGOSUB1020:GOTO2010                         AD
·2050 NEXT:B=(T(1)*4096)+(T(2)*256)+(T(3)*16)+
T(4):RETURN                                         GF
·2060 IFA$>"@"ANDA$<"G"THENT(A)=ASC(A$)-55:RET
URN                                                 EH
·2070 IFA$>"/"ANDA$<":"THENT(A)=ASC(A$)-48:RET
URN                                                 KP
·2080 T(A)=16:RETURN                                NP
·2500 REM ADRESS CHECK                              LI
·2510 IFAD>ENTHEN1030                               MI
·2515 IFB<SRORB>ENTHEN1040                          MG
·2520 IFB<256OR(B>4096ANDB<49152)ORB>53247THE
N1050                                               MI
·2530 RETURN                                        IM
·3000 REM ADDRESS TO HEX                            EB
·3010 AC=AD:A=4096:GOSUB3070                        HG
·3020 A=256:GOSUB3070                               CE
·3030 A=16:GOSUB3070                                PN
·3040 A=1:GOSUB3070                                 MJ
·3060 RETURN                                        IM
·3070 T=INT(AC/A):IFT>9THENA$=CHR$(T+55):GOTO3
090                                                 CJ
·3080 A$=CHR$(T+48)                                 JP
·3090 PRINTA$;:AC=AC-A*T:RETURN                     AC
·4000 A$="**SAVE**":GOSUB4200                       AI
·4050 OPEN1,T,1,A$:SYS680:CLOSE1                    LH
·4060 IFST=0THENEND                                 EO
·4070 GOSUB1060:IFT=8THENGOSUB1200                  FJ
·4080 GOTO4000                                      FF
·4100 A$="**LOAD**":GOSUB4200                       AB
·4150 OPEN1,T,0,A$:SYS690:CLOSE1                    MF
·4160 IFST=64THEN110                                JH
·4170 GOSUB1070:IFT=8THENGOSUB1200                  CM
·4180 GOTO4100                                      FO
·4200 PRINT" ":PRINTTAB(14)A$                       FG
·4210 PRINT:A$="":INPUT"FILENAME";A$                OM
·4215 IFA$=""THEN4210                               GF
·4220 PRINT:PRINT"TAPE OR DISK?":PRINT              DF
·4230 GETB$:T=1:IFB$="D"THENT=8:A$="@0:"+A$:RE
TURN                                                IG
·4240 IFB$<>"T"THEN4230                             FN
·4250 RETURN                                        IM
·4500 B$="CONTINUE FROM ADDRESS":GOSUB2010:AD=
B                                                   DK
·4510 GOSUB2515:IFB=0THEN4500                       MA
·4520 PRINT:GOTO110                                 OI
·4700 B$="BEGIN SCAN AT ADDRESS":GOSUB2010:AD=
B                                                   FH
·4705 GOSUB2515:IFB=0THEN4700                       NK
·4706 PRINT:GOTO4740                                DI
·4710 FORB=0TO7:AC=PEEK(AD+B):GOSUB3030:IFAD+B
=ENTHENAD=SR:GOSUB1080:GOTO110                      BK
·4715 PRINT" ";:NEXTB                               EC
·4720 PRINT:AD=AD+8                                 GN
·4730 GETB$:IFB$=CHR$(136)THEN110                   MN
·4740 GOSUB3010:PRINT": ";:GOTO4710                 JD
```

IMPORTANT! Letters on white background are **Bug Repellent** line codes. **Do not enter them!** Pages 63 and 64 explain these codes and provide other essential information on entering ***Ahoy!*** programs. Refer to these pages **before** entering any programs!

A GAMEBOARD BIGGER THAN THE SCREEN

FROM PAGE 98

MANSION DISPLAY SETUP

WARNING: Do not run this program without SAVEing it, preferably twice, because if there is any error in your typing that causes it to crash while RUNning, the only copy you'll ever get is the copy you already SAVEd—or the one you type all over again. Cassette users, see the article for line changes. And be careful when you type in graphics characters in DATA lines 52000 to 53123. All graphics characters in those lines are produced by pressing a key from A to Z while holding down SHIFT. See article for more information.

```
•10 DIM DM(11),DB(11)                              FH
•20 GOSUB 50000:GOSUB 60000                        DF
•27 REM                                            JD
•28 REM SWITCH TO MANSION ENTRANCE                 EI
•29 REM                                            JD
•100 SAVE "@0:DISPLAY SETUP",8                     KK
•110 FOR I=0 TO 3:POKE 1024+I,PEEK(43+I):
 NEXT                                              KI
•120 POKE 43,0:POKE 44,72:POKE 45,0:POKE
 46,128:SAVE "@0:DISPLAY DATA",8,1                 OA
•130 POKE 43,PEEK(1024):POKE 44,PEEK(1025
 ):POKE 45,PEEK(1026):POKE 46,PEEK(1027)           AJ
•140 PRINT "[RVSOFF]PRESS RUN/STOP-RESTOR
 E";:POKE BR,YQ:PRINT "[HOME]";:END                LG
•49995 REM                                         JD
•49996 REM ARRANGE VIDEO MEMORY                    AO
•49997 REM                                         JD
•49998 REM SET VIDEO BANK                          CI
•49999 REM                                         JD
•50000 VM=2:VB=16384:POKE56578,PEEK(56578
 )OR3:POKE56576,(PEEK(56576)AND252)OR VM           LN
•50007 REM                                         JD
•50008 REM SET CHAR & SCREEN MEM VALUES            GN
•50009 REM                                         JD
•50010 CM=14:CB=VB+CM*1024:FOR I=0 TO 11:
 DM(I)=CM+16*(I+2):NEXT                            PK
•50020 VR=53272:ZQ=PEEK(VR)                        JH
•50027 REM                                         JD
•50028 REM TELL BASIC WHERE SCREEN IS              AI
•50029 REM                                         JD
•50030 FOR I=0 TO 11:DB(I)=INT((VB+1024*(
 I+2))/256):NEXT                                   CK
•50040 BR=648:YQ=PEEK(BR)                          FO
•50050 POKE 53281,7:POKE 53280,11:PRINT "
 [c 2]";                                           EO
•50095 REM                                         JD
•50096 REM SET UP DISPLAYS                         KD
•50097 REM                                         JD
•50098 REM MOVE TO PROPER SCREEN                   BO
•50099 REM                                         JD
•51000 FOR I=0 TO 11:POKE VR,DM(I):POKE B
 R,DB(I):PRINT "[CLEAR]";                          CK
•51001 REM BEGINWITH FOR I=0 TO 11:                HK
•51007 REM                                         JD
•51008 REM READ ONE LINE AT A TIME                 BJ
•51009 REM                                         JD
•51010 FOR X=0 TO 23:READ A$                       PN
•51015 PRINT "[HOME]";:IF X>0 THEN FOR J=
 1 TO X:PRINT "[DOWN]";:NEXT J                     PL
•51020 Y=LEN(A$):Z=0                               AN
•51027 REM                                         JD
•51028 REM LOOP TO READ PACKED DATA                FE
•51029 REM                                         JD
•51030 Z=Z+1                                       EB
•51035 B$=MID$(A$,Z,1):T=ASC(B$):IF T=212
 OR T=213 THEN 51060                               HK
•51040 IF T>96 OR (T>52 AND T<64) THEN PR
 INT "[RVSON]"B$;:GOTO 51070                       OJ
•51047 REM                                         JD
•51048 REM LOOP TO PRINT UNPACKED DATA             EL
•51049 REM                                         JD
•51060 Z=Z+1:B=ASC(MID$(A$,Z,1)):PRINT "[
 RVSON]";:FOR J=1 TO B-48:PRINT B$;:NEXT
 J                                                 PE
•51070 IF Z<Y THEN 51030                           KL
•51080 NEXT X                                      NK
•51090 NEXT I:RETURN                               JI
•52000 DATA "[s M][5"[s B]"]9==:[3"[s B]"
 ][s F][4"[s B]"][s F][4"[s B]"]9==:[5"[s
 B]"][s L]G7"                                      MA
•52001 DATA "[s A]K<[s A]C4[s A]L=[s A]G7
 "                                                 MJ
•52002 DATA "[s A]K<[s A]C4[s A]L=[s C]G7
 "                                                 ML
•52003 DATA "[s A]K<5C4[s A]L=[s C]G7"             HP
•52004 DATA "[s A]K<=C4[s A]L=[s C]G7"             EH
•52005 DATA "[s A]K<=C4[s A]L=[s C]G7"             EH
•52006 DATA "[s A]K<6C4[s A]L=[s C]G7"             IO
•52007 DATA "[s A]K<[s N][4">"][s O]L=[s
 C]G7"                                             GI
•52008 DATA "7K<[s N]A4[s O]L=[s A]G7"             EG
•52009 DATA "=K<[s N]A4[s O][4"[s B]"]9==
 :[5"[s B]"][s L]G7"                               JO
•52010 DATA "=K<[s N]A4[s O]J=[s A]G7"             HG
•52011 DATA "8K<[s N]A4[s O]J=[s C]G7"             CF
•52012 DATA "[s A]K<[s N]A4[s O]J=[s C]G7
 "                                                 OM
•52013 DATA "[s A]K<[s N]A4[s O]J=[s C]G7
 "                                                 OM
•52014 DATA "[s A]K?J@[s C]G7"                     PI
•52015 DATA "[s A]K?J@[s C]G7"                     PI
•52016 DATA "[s A]K?J@[s A]F5G2"                   HH
•52017 DATA "[s A]K?J@[s A]F5G2"                   HH
•52018 DATA "[s E][3"[s B]"][6"[s D]"][4"
 [s B]"];==<[4"[s B]"][6"[s D]"][4"[s B]"
 ][s I]F5G2"                                       BD
•52019 DATA "FVG2"                                 OH
```

```
•52020 DATA "FVG2"                          OH
•52021 DATA "FVG2"                          OH
•52022 DATA "FVG2"                          OH
•52023 DATA "FVG2"                          OH
•52100 DATA "G7[s G][5"[s D]"][s B]9==:[s
 B][s B][s E][s B][s B]9=[6"[s B]"][s E]
[s B][s B]=:[3"[s B]"][s M]"                HJ
•52101 DATA "G7[s A]PBN4M6[3"[s R]"][s A]
"                                           OH
•52102 DATA "G7[s A]PBN4M8[s R][s A]"       FO
•52103 DATA "G7[s C]PA[s G]N4[s H]M7[s R]
[s A]"                                      MC
•52104 DATA "G7[s C]P=[s N]A3[s O]N4[s A]
[s R]M6[s R][s A]"                          KE
•52105 DATA "G7[s C]P=[s N]A3[s O]N4[s A]
[s R]M6[s R][s A]"                          KE
•52106 DATA "G7[s C]P=[s N]A3[s O]N4[s A]
[s R]M6[s R][s A]"                          KE
•52107 DATA "G7[s A]P=[s N][3"?"][s K][4"
[s B]"][s L][s S]M6[s R][s A]"              ID
•52108 DATA "G7[s A]P=5C3[s A]O4[s V][s S
]M75"                                       ND
•52109 DATA "G7[s A]P==C3[s A]O4[s A][s R
]M7="                                       BB
•52110 DATA "G7[s A]P=6C3[s A]O4[s A][s R
]M7="                                       OK
•52111 DATA "G7[s A]P=[s N][3">"][s O]O4[
s A][s R]M76"                               LP
•52112 DATA "G7[s C]P=[s N]A3[s O]O4[s A]
[s R]M6[s R][s A]"                          AD
•52113 DATA "G7[s C]P=[s N]A3[s O]O4[s A]
[s R]M6[s R][s A]"                          AD
•52114 DATA "G7[s C]P=[s N]A3[s O]O4[s A]
[s R]M6[s R][s A]"                          AD
•52115 DATA "G7[s C]PA[s J][s B];=[s B][s
 I]M7[s S][s A]"                            EI
•52116 DATA "G2F5[s A]PBM<[s S][s A]"       CP
•52117 DATA "G2F5[s A]PBM8[5"[s R]"][s A]
"                                           IG
•52118 DATA "G2F5[s J][4"[s B]"[7"[s D]"[
5"[s B]"];==<[4"[s B]"[7"[s D]"[4"[s B]"
][s E]"                                     BK
•52119 DATA "G2FV"                          ON
•52120 DATA "G2FV"                          ON
•52121 DATA "G2FV"                          ON
•52122 DATA "G2FV"                          ON
•52123 DATA "G2FV"                          ON
•52200 DATA "EUG3"                          OK
•52201 DATA "EUG3"                          OK
•52202 DATA "EUG3"                          OK
•52203 DATA "EUG3"                          OK
•52204 DATA "EUG3"                          OK
•52205 DATA "[s G][3"[s D]"][s B][3"[s D]
"][s F][s B][s D][s D][s B][s F][s B];==
<;==<;==<;==<[s B][s H]E4G3"                IA
•52206 DATA "[s C]R7[s A][s Q]B3[s A]QB[s
 A]E4G3"                                    CC
•52207 DATA "[s C]R7[s K][s B][s B]B2[s A
]QB[s A]E4G3"                               BB
•52208 DATA "[s A]R7[s A][s R]B3[s A]QB[s
 C]G7"                                      ND
•52209 DATA "7R7[s A][s S]B3[s A]QB[s A]G
7"                                          AI
•52210 DATA "=R7[s A][s S]B3[s A]QB[s C]G
7"                                          DE
•52211 DATA "[s A]R7[s A][s R]B3[s A]QB[s
 A]G7"                                      NB
•52212 DATA "[s K][4"[s B]"]=<[s B][s E][
s B][s B]=<[s L]QB[s C]G7"                  BL
•52213 DATA "[s A]S<[s A]QB[s A]G7"         KJ
•52214 DATA "[s C]S<[s A]QB[s C]G7"         OB
•52215 DATA "[s A]S<[s A]QB[s A]G7"         KJ
•52216 DATA "7S<5QB[s C]G7"                 JJ
•52217 DATA "=S<=QB[s A]G7"                 MB
•52218 DATA "=S<=QB[s C]G7"                 MD
•52219 DATA "8S7[s N]>[s O]S26Q5[4"[s R]"
]Q9[s A]G7"                                 IH
•52220 DATA "[s A]S7[s N]A1[s O]S2[s A]Q5
[s R]Q2[s R]Q9[s C]G7"                      NM
•52221 DATA "[s C]S<[s N]A4[s O][s S]Q<[s
 A]G7"                                      OP
•52222 DATA "[s A]S<[s N]A4[s O][4"[s R]"
]Q9[s A]G7"                                 HP
•52223 DATA "[s M][5"[s B]"]9==:[3"[s B]"
][s M][4"?"][s M][4"[s B]"]9==:[5"[s B]"
][s L]G7"                                   JO
•52300 DATA "V?EI"                          PH
•52301 DATA "V?EI"                          PH
•52302 DATA "V6W3V6EI"                      CG
•52303 DATA "V6W3V6EI"                      CG
•52304 DATA "V4W7V4EI"                      BG
•52305 DATA "V4W7V:TB[s G]"                 NB
•52306 DATA "V4W7V:TB[s C]"                 MN
•52307 DATA "V6W3V<TB[s C]"                 NN
•52308 DATA "V6W3V<TB[s A]"                 NP
•52309 DATA "VETB7"                         EA
•52310 DATA "VETB="                         DK
•52311 DATA "VETB[s A]"                     MG
•52312 DATA "VETB[s K]"                     MM
•52313 DATA "G7V>TB[s A]"                   DC
•52314 DATA "G7V=[s G][10"[s D]"][s H]T7[
s C]"                                       FH
•52315 DATA "G7V=[s C]U:[s C]T7[s A]"       DJ
•52316 DATA "G7V=[s C]U:[s C]T77"           KH
•52317 DATA "G7V=[s C]U:[s C]T7="           LN
•52318 DATA "G7V=[s C]U:[s C]T7="           LN
•52319 DATA "G7V=[s C]U:[s C]T78"           KE
•52320 DATA "G7V=[s C]U:[s C]T7[s A]"       DJ
•52321 DATA "G7V=[s C]U:[s C]T7[s C]"       DL
•52322 DATA "G7V=[s C]U:[s X]T7[s A]"       GA
•52323 DATA "G7[s G][5"[s D]"][s B]9==:[s
 B][s B][s E][s B][s B]9=[6"[s B]"][s E]
[s B][s B]=:[3"[s B]"][s M]"                HJ
•52400 DATA "[s A]XO[s A][s T]7"            AL
•52401 DATA "[s A]XO[s A][s T]7"            AL
•52402 DATA "[s A]XO[s A][s T]7"            AL
```

```
•52403 DATA "[s K][7"[s B]"]9==:[s B][s F
 ][4"[s B]"][s H]X=[s A][s T]7"            EB
•52404 DATA "[s L][<[s N][4">"][s O]X=[s
 A][s T]7"                                 DO
•52405 DATA "[s A][<[s N]A4[s O]X=[s A][s
  T]7"                                     MN
•52406 DATA "[s A][<[s N]A4[s O]X=[s A][s
  T]7"                                     MN
•52407 DATA "[s A][<[s N]A4[s O]X=[s A][s
  T]7"                                     MN
•52408 DATA "[s V][<[s N]A4[s O]X=[s A][s
  T]7"                                     II
•52409 DATA "[s K][7"[s B]"];==<[s B][s I
 ]Z4[s K][7"[s B]"]=:[4"[s B]"][s L][s T]
 7"                                        IG
•52410 DATA "[s A]ZA[s A]Y=[s A][s T]7"    GP
•52411 DATA "=ZA[s A]Y=[s A][s T]7"        ML
•52412 DATA "6ZA[s A]Y=[s A][s T]7"        ME
•52413 DATA "[s A]ZA7Y=[s A][s T]7"        MF
•52414 DATA "[s A]ZA=Y=[s A][s T]7"        NL
•52415 DATA "[s A]ZA=Y=[s A][s T]7"        NL
•52416 DATA "[s A]ZA8Y=[s A][s T]7"        MC
•52417 DATA "[s A]ZA[s A]Y=[s A][s T]7"    GP
•52418 DATA "[s A]ZA[s A]Y=[s A][s T]7"    GP
•52419 DATA "[s A]ZA[s A]Y=[s A][s T]7"    GP
•52420 DATA "[s A]ZA[s A]Y=[s A][s T]7"    GP
•52421 DATA "[s A]ZA[s A]Y=[s A][s T]7"    GP
•52422 DATA "[s A]ZA[s A]Y=[s A][s T]7"    GP
•52423 DATA "[s E][17"[s B]"][s E][13"[s
 B]"][s I][s T]7"                          LJ
•52500 DATA "[s T]7[s G][13"[s B]"][s F][
 17"[s B]"][s L]"                          DP
•52501 DATA "[s T]7[s A][BACKARROW]=5[EP]
 @[s Z][s A]"                              IL
•52502 DATA "[s T]7[s A][BACKARROW]==[EP]
 A[s A]"                                   NP
•52503 DATA "[s T]7[s A][BACKARROW]7[s G]
 [s B]=:[s B][s B][s L][EP]A[s A]"         OF
•52504 DATA "[s T]7[s A][BACKARROW]7[s A]
 [s Q]B4[s N]A3[s O][EP]=[s A]"            LF
•52505 DATA "[s T]7[s A][BACKARROW]7[s A]
 [s S]B4[s N]A3[s O][EP]=[s A]"            LP
•52506 DATA "[s T]7[s A][BACKARROW]7[s A]
 [s R]B4[s N]A3[s O][EP]=="                CO
•52507 DATA "[s T]7[s A][BACKARROW]7[s K]
 [5"[s B]"][s N]A3[s O][EP]=6"             GE
•52508 DATA "[s T]7[s A][BACKARROW]7[s A]
 [s R]B4[s N]A3[s O][EP]2[s G][s B][s F]9
 =[s B][s F][4"[s B]"][s L]"               OO
•52509 DATA "[s T]7[s K][s B][s B];=<[s B
 ][s B][s L][s S]B4[s N][3"?"][s O][EP]2[
 s A][s P][s A]B2[s S][s V]C4[s A]"        NH
•52510 DATA "[s T]7[s A]C7[s A][s Q]B4[s
 V]C3[s A][EP]2[s A]B4[s S][s K]9==:[s L]
 "                                         JB
•52511 DATA "[s T]7[s K][7"[s B]"][s E][s
  B]=<[s B][s B][s E]9=:[s L][EP]2[s K][5
 "[s B]"][s L]]4[s A]"                     LA
•52512 DATA "[s T]7[s A][UPARROW]A5[EP]2[
 s A][s Q]B4[s A]]4[s A]"                  PL
•52513 DATA "[s T]7[s A][UPARROW]A=[EP]2[
 s A][s S]B4[s A]]4[s A]"                  EN
•52514 DATA "[s T]7[s A][UPARROW]A[s K]9=
 [s L][s R]B4[s A]]4[s A]"                 LF
•52515 DATA "[s T]7[s A][UPARROW]A[s A]]2
 [s J][s B]=<[s B][s B][s I]]4[s A]"       AE
•52516 DATA "[s T]7[s A][UPARROW]A[s A]]=
 [s A]"                                    FF
•52517 DATA "[s T]7[s A][UPARROW]A[s A]]=
 [s A]"                                    FF
•52518 DATA "[s T]7[s J][17"[s B]"][s E][
 13"[s B]"][s E]"                          IM
•52519 DATA "[s T]X"                       PH
•52520 DATA "[s T]X"                       PH
•52521 DATA "[s T]X"                       PH
•52522 DATA "[s T]X"                       PH
•52523 DATA "[s T]X"                       PH
•52600 DATA "[s M][12"[s B]"][s M][s W][s
  L]>>[s O]I3[s K][9"[s B]"][s L]H4[s U]3
 "                                         FD
•52601 DATA "[s A] <[s A]C1[s N]A2[s O]I3
 [s A]#9[s A]H4[s U]3"                     DB
•52602 DATA "[s A] <5C1[s N]A2[s O]I3[s A
 ]#97H4[s U]3"                             FL
•52603 DATA "[s A] <=C1[s N]A2[s O]I37#9=
 H4[s U]3"                                 ED
•52604 DATA "[s A] <6C1[s N]A2[s O]I3=#9=
 H4[s U]3"                                 KI
•52605 DATA "[s A] <[s A]C1[s N]A2[s O]I3
 [s A]#98H4[s U]3"                         HK
•52606 DATA "[s E][9"[s B]"]9=:[s E][s B]
 [s E]=:[s I]I3[s A]#97H4[s U]3"           PD
•52607 DATA "IF[s A]#9=H4[s U]3"           DK
•52608 DATA "IF[s A]#9=H4[s U]3"           DK
•52609 DATA "IF[s A]#98H4[s U]3"           DD
•52610 DATA "[s F][s B][s B][s F][10"[s B
 ]"]=:[s F][3"[s B]"][s F][s B][s L]#9[s
 A]H4[s U]3"                               EN
•52611 DATA "[s A]C2[s A]!<[s A][s R][s S
 ][s R][s A][s P][s A]#9[s A]H4[s U]3"     II
•52612 DATA "[s A]C2[s A]!<[s A]B5[s A]#9
 [s C]H4[s U]3"                            LF
•52613 DATA "[s A]C27!<=B5=#9[s C]H4[s U]
 3"                                        GL
•52614 DATA "[s A]C2=!<8B56#9[s C]H4[s U]
 3"                                        DJ
•52615 DATA "[s A]C28!<[s A]B5[s K][3"[s
 B]"];=<[3"[s B]"][s L]H4[s U]3"           AB
•52616 DATA "[s A]C2[s A]!<[s A]B5[s A]C9
 [s A]H4[s U]3"                            NH
•52617 DATA "[s A]C2[s A]!<[s A]B5[s A]C9
 [s A]H4[s U]3"                            NH
•52618 DATA "[s E][s B][s B][s E][3"[s D]
 "][s B]9==:9==:[s E][s B][3"[s D]"][s B]
 [s E][9"[s B]"][s I]H4[s U]3"             DD
•52619 DATA "HU[s U]3"                     HF
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·52620 DATA "HU[s U]3"                        HF
·52621 DATA "HU[s U]3"                        HF
·52622 DATA "[s U]X"                          PI
·52623 DATA "[s U]X"                          PI
·52700 DATA "[s U]3H4[s G][s B][s B][3"[s
  D]"][s B][s B][s F][5"[s B]"][s F][3"[s
  B]"][4"[s D]"][3"[s B]"][s F][s B][s B]
  [s D][s D][s B][s B][s M]"              NI
·52701 DATA "[s U]3H4[s A]B6[s P][s A][s
  R][s S][s R][s S][s R][s A]$:[s A][s Q]B
  5[s A]"                                 BK
·52702 DATA "[s U]3H4[s A]B7[s A]'5[s A]$
  :[s K][s B]B5[s A]"                     LC
·52703 DATA "[s U]3H4[s A]B7='5=$:[s A][s
  R]B5[s A]"                              LM
·52704 DATA "[s U]3H4[s A]B76'58$:[s A][s
  S]B5[s A]"                              LB
·52705 DATA "[s U]3H4[s K][7"[s B]"][s L]
  '5[s K];=<[s H]$6[s A][s R]B5[s A]"     DI
·52706 DATA "[s U]3H4[s A]C6[s Z][s A]'5[
  s K][s B][s F][s B][s M][s B][s B]=<[s B
  ][s B][s E][s B]=<[3"[s B]"][s E]"      PA
·52707 DATA "[s U]3H4[s K]9=:[s B]9=:[s I
  ]'55C1[s A]C17I>"                       GC
·52708 DATA "[s U]3H45&==C1[s A]C1=I>"    LA
·52709 DATA "[s U]3H4=&=6C1[s A]C18I>"    IG
·52710 DATA "[s U]3H4=&=[s N][3">"][s O]I
  2[s G][6"[s B]"]=:[s F][s B][s F]"      LF
·52711 DATA "[s U]3H46&=[s N]A3[s O]I2[s
  A]%85C1[s A]"                           PB
·52712 DATA "[s U]3H45&=[s N]A3[s O]I2[s
  A]%8=C1[s A]"                           NC
·52713 DATA "[s U]3H4=&=[s N]A3[s O]I2[s
  A]%8[s A]C1[s A]"                       JO
·52714 DATA "[s U]3H4=&=[s N]A3[s O]I2[s
  A]%8[s A]C1[s A]"                       JO
·52715 DATA "[s U]3H46&=5I6[s A]%8[s A]C1
  [s A]"                                  MJ
·52716 DATA "[s U]3H4[s A]&==I6[s A]%8=C1
  [s A]"                                  NA
·52717 DATA "[s U]3H4[s A]&=6I6[s A]%86C1
  [s A]"                                  JM
·52718 DATA "[s U]3H4[s J][s B][s B][3"[s
  D]"][3"[s B]"][3"[s D]"][s B][s B][s E]
  [s B]9==:[s B][s E]9==:9==:[s E][s B][s
  E]"                                     KL
·52719 DATA "[s U]3HU"                    GD
·52720 DATA "[s U]3HU"                    GD
·52721 DATA "[s U]3HU"                    GD
·52722 DATA "[s U]X"                      PI
·52800 DATA "[s U]X"                      PI
·52801 DATA "[s U]X"                      PI
·52802 DATA "HU[s U]3"                    HF
·52803 DATA "HU[s U]3"                    HF
·52804 DATA "HU[s U]3"                    HF
·52805 DATA "[s G][s B][s B][s D][s Y][s
  D][s B][s B]=:[s B][s F][s B][s F][s B][
  s B][s D][s D][4"[s B]"][s F];==<;==<[s
  B][s H]H4[s U]3"                        ED
·52806 DATA "[s A]*:[s A]C1[s A]B5[s P][s
  S][s R][s A](9[s A]H4[s U]3"            IG
·52807 DATA "[s A]*:5C1[s A]B8=(9[s A]H4[
  s U]3"                                  MM
·52808 DATA "[s A]*:=C1[s A]B86(9[s A]H4[
  s U]3"                                  MP
·52809 DATA "[s A]*:=C1[s A]B1W3B1[s G][s
  B][s B][s L](9[s C]H4[s U]3"            KK
·52810 DATA "[s A]*:6C1[s A]B1W3B1[s A][s
  Q]B15(9[s C]H4[s U]3"                   GG
·52811 DATA "[s A]*:[s A]C1[s A]B1W3B1[s
  A][s S]B1=(9[s A]H4[s U]3"              AF
·52812 DATA "[s K][3"[s B]"];=[5"[s B]"][
  s E][s B][s M][5"[s B]"][s E][s B][s B][
  s L](9[s A]H4[s U]3"                    HP
·52813 DATA "[s A])<[s A]C8[s A](9[s A]H4
  [s U]3"                                 NA
·52814 DATA "[s C])<[s A]C8[s A](9[s A]H4
  [s U]3"                                 LC
·52815 DATA "[s A])2[s U]8)2[s K]9==:9==:
  [s L](9[s C]H4[s U]3"                   HF
·52816 DATA "[s A])2[s U]8)2[s A]I8[s A](
  9[s C]H4[s U]3"                         DA
·52817 DATA "[s C])2[s U]8)2=I8=(9[s C]H4
  [s U]3"                                 CC
·52818 DATA "[s C])2[s U]8)26I88(9[s A]H4
  [s U]3"                                 KO
·52819 DATA "[s A])2[s U]3[s N]>[s O][s U
  ]2)2[s A]I8[s A](9[s A]H4[s U]3"        MH
·52820 DATA "[s A])2[s U]3[s N]A1[s O][s
  U]2)2[s A]I8[s K][s B];=<[s B];=<[s B][s
  L]H4[s U]3"                             FF
·52821 DATA "[s C])<[s N]A4[s O]I3[s A]C9
  [s A]H4[s U]3"                          AG
·52822 DATA "[s V])<[s N]A4[s O]I3[s A]C9
  [s A]H4[s U]3"                          BB
·52823 DATA "[s M][10"[s B]"][s F][s B][s
  L][4"?"][s O]I3[s K][9"[s B]"][s L]H4[s
  U]3"                                    BD
·52900 DATA "[s I]D5[s K][4"[s B]"][s L]I
  3[s K][s B][s B][s M][7"[s B]"][s L]D5[s
  A][s U]7"                               FJ
·52901 DATA "D6[s A]B3[s P][s A]I3[s A]C2
  [s A]+7[s A]D5[s A][s U]7"              ND
·52902 DATA "D6[s A]B45I3[s A]C27+7[s A]D
  5[s A][s U]7"                           PG
·52903 DATA "D6[s A]B4=I3[s A]C2=+7[s A]D
  5[s A][s U]7"                           CE
·52904 DATA "[s F][5"[s B]"][s L]B3[s S][
  s A]I3[s A]C28+7[s A]D5[s A][s U]7"     KG
·52905 DATA "[s A]-5[s K][4"[s B]"][s L]I
  3[s K][s B][s B][s I]+5[s G][s B][s E][5
  "[s B]"][s L][s U]7"                    AK
·52906 DATA "[s A]-5[s A]B4[s A]I37+8[s A
  ],7[s A][s U]7"                         NL
·52907 DATA "[s A]-5[s A]B4[s A]I3=+8[s A
  ],7[s C][s U]7"                         AD
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•52908 DATA "[s K];=[s H]-2[s A]B4[s A]I3
 [s A]+8[s A],7[s C][s U]7"            EH
•52909 DATA "[s A]C2[s A]-2[s A][s Q]B2[s
  S][s A]I3[s A]+8[s A],7[s A][s U]7"  MK
•52910 DATA "[s E][s B][s B][s E]=<[s E][
 s B]=<[s B][s I]I3[s J][8"[s B]"][s I],7
 [s A][s U]7"                           CL
•52911 DATA "I?,A[s C][s U]7"           IF
•52912 DATA "I?,A[s C][s U]7"           IF
•52913 DATA "I?,A[s A][s U]7"           IH
•52914 DATA "[5"[s B]"][s H]I2[s G][5"[s
 B]"][s H]I2[s G][5"[s B]"][s H],2[s G][5
 "[s B]"][s L][s U]7"                   AA
•52915 DATA "D5[s J][s D][s D][s I]D5[s J
 ][s D][s D][s I]D5[s J][s D][s Y][s I]D5
 [s A][s U]7"                           AI
•52916 DATA "DP[s A][s U]7"             DB
•52917 DATA "DP[s A][s U]7"             DB
•52918 DATA "[32"[s B]"][s I][s U]7"    OG
•52919 DATA "[s U]X"                    PI
•52920 DATA "[s U]X"                    PI
•52921 DATA "[s U]X"                    PI
•52922 DATA "[s U]X"                    PI
•52923 DATA "[s U]X"                    PI
•53000 DATA "[s U]7[s G][31"[s B]"][s I]" OP
•53001 DATA "[s U]7[s A]DP"             EL
•53002 DATA "[s U]7[s A]DP"             EL
•53003 DATA "[s U]7[s A]D5[s G][s D][s D]
 [s H]D5[s G][s D][s D][s H]D5[s G][s D][
 s D][s H]D5"                           NB
•53004 DATA "[s U]7[s K][5"[s B]"][s I][s
  Z]11[s J][3"[s B]"][s F][s B][s I].2[s
 J][s B][s F][s B][s F][s B][s I]/2[s J][
 s B][s F][s B][s W][s F]"              GO
•53005 DATA "[s U]7[s A]1<[s A].6[s A]C17
 /6[s A]02[s A]"                        OB
•53006 DATA "[s U]7[s A]1<[s A].6[s A]C1=
 /6[s A]02[s A]"                        ML
•53007 DATA "[s U]7[s A]1<[s A].6[s K][s
 B][s L]/6[s A]02[s A]"                 KH
•53008 DATA "[s U]7[s C]1<[s A].6=C1[s A]
 /6[s A]02[s A]"                        AJ
•53009 DATA "[s U]7[s C]1<[s A].66C1[s A]
 /6[s A]02[s A]"                        PG
•53010 DATA "[s U]7[s C]1<[s J][4"[s B]"]
 =<[s E][s B][s E];=[4"[s B]"][s E];=[s E
 ]"                                     DD
•53011 DATA "[s U]7[s A]1<ID"           KK
•53012 DATA "[s U]7[s A]1<ID"           KK
•53013 DATA "[s U]7[s A]1<ID"           KK
•53014 DATA "[s U]7[s K][5"[s B]"][s H]12
 [s G][5"[s B]"][s H]I2[s G][5"[s B]"][s
 H]I2[s G][5"[s B]"]"                   BA
•53015 DATA "[s U]7[s A]D5[s J][s D][s D]
 [s I]D5[s J][s D][s D][s I]D5[s J][s D][
 s D][s I]D5"                           LD
•53016 DATA "[s U]7[s A]DP"             EL
•53017 DATA "[s U]7[s A]DP"             EL
•53018 DATA "[s U]7[s J][32"[s B]"]"    PD
•53019 DATA "[s U]X"                    PI
•53020 DATA "[s U]X"                    PI
•53021 DATA "[s U]X"                    PI
•53022 DATA "[s U]X"                    PI
•53023 DATA "[s U]X"                    PI
•53100 DATA "[s U]X"                    PI
•53101 DATA "[s U]X"                    PI
•53102 DATA "[s U]83A[s U]?"            GM
•53103 DATA "[s U]83A[s U]?"            GM
•53104 DATA "[s U]83A[s U]?"            GM
•53105 DATA "[s G][5"[s B]"][s F][s B][s
 B][4"[s D]"][s B][s B]9=:[s B][s B][4"[s
  D]"][s B][s B][s F][5"[s B]"][s H][s U]
 7"                                     AA
•53106 DATA "[s A]D5[s A]2C[s A]D5[s A][s
  U]7"                                  DJ
•53107 DATA "[s A]D5[s A]2C[s A]D5[s A][s
  U]7"                                  DJ
•53108 DATA "[s A]D5[s A]2C[s A]D5[s A][s
  U]7"                                  DJ
•53109 DATA "[s A]D5[s A]2C[s A]D5[s A][s
  U]7"                                  DJ
•53110 DATA "[s A]D3[s G][s B][s I]2C[s J
 ][s B][s H]D3[s A][s U]7"              MH
•53111 DATA "[s A]D3[s C]2G[s C]D3[s A][s
  U]7"                                  EB
•53112 DATA "[s A]D3[s C]2G[s C]D3[s A][s
  U]7"                                  EB
•53113 DATA "[s A]D3[s J][s B][s H]2C[s G
 ][s B][s I]D3[s A][s U]7"              FH
•53114 DATA "[s A]D5[s A]2C[s A]D5[s A][s
  U]7"                                  DJ
•53115 DATA "[s A]D5[s A]2C[s A]D5[s A][s
  U]7"                                  DJ
•53116 DATA "[s A]D5[s A]2C[s A]D5[s A][s
  U]7"                                  DJ
•53117 DATA "[s A]D3[s G][s B][s I]2C[s J
 ][s B][s H]D3[s A][s U]7"              MH
•53118 DATA "[s A]D3[s C]2G[s C]D3[s A][s
  U]7"                                  EB
•53119 DATA "[s A]D3[s C]2G[s C]D3[s A][s
  U]7"                                  EB
•53120 DATA "[s A]D3[s J][s B][s H]28[s N
 ]A2[s K][7"[s B]"][s F][s B][s I]D3[s A]
 [s U]7"                                JM
•53121 DATA "[s A]D5[s A]28[s N]A2[s O]47
 [s A]D5[s A][s U]7"                    OC
•53122 DATA "[s A]D5[s A]28[s N]A2[s O]47
 [s V]D5[s A][s U]7"                    NP
•53123 DATA "[s I]D5[s K][4"[s B]"][s H]I
 3[s N]??[s K][7"[s B]"][s L]D5[s A][s U]
 7"                                     KA
•59995 REM                              JD
•59996 REM SET UP CHARACTER SET         ML
•59997 REM                              JD
•59998 REM READ AND POKE CUSTOM CHARS   NG
•59999 REM                              JD
•60000 FOR I=0 TO 90:READ A:A=A*8+CB:FOR
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J=0 TO 7:B=J+A:READ X:POKE B,X:NEXT:NEXT IO
·60010 POKE 56334,PEEK(56334)AND 254:POKE
 1,PEEK(1)AND 251                        BE
·60020 FOR I=8 TO 26*8:POKE CB+I,PEEK(532
48+I):NEXT                               KG
·60025 FOR I=36*8 TO 42*8+7:POKE CB+I,PEE
K(53248+I):NEXT                          KF
·60030 FOR I=44*8 TO 58*8:POKE CB+I,PEEK(
53248+I):NEXT                            PN
·60040 FOR I=CB+32*8 TO CB+32*8+7:POKE I,
0:NEXT                                   PE
·60050 POKE 1,PEEK(1)OR 4:POKE 56334,PEEK
(56334)OR 1                              IE
·60090 RETURN                            IM
·62997 REM                               JD
·62998 REM CHARACTER DATA                EG
·62999 REM                               JD
·63000 DATA128,26,26,38,88,152,36,36,36  AC
·63001 DATA129,0,255,255,0,0,255,255,0   DM
·63002 DATA130,51,51,204,204,51,51,204,20
4                                        KG
·63003 DATA131,0,0,0,0,0,0,0,0           NN
·63004 DATA132,1,2,4,8,16,32,64,128      OH
·63005 DATA133,8,128,8,128,8,128,8,128   AP
·63006 DATA134,119,136,136,136,119,136,13
6,136                                    JA
·63007 DATA135,18,130,164,52,16,66,75,25 CD
·63008 DATA136,34,136,34,136,34,136,34,13
6                                        FI
·63009 DATA137,0,0,0,0,0,0,0,0           ED
·63010 DATA138,0,0,0,0,0,0,0,0           GC
·63011 DATA139,0,0,0,0,0,0,0,0           EF
·63012 DATA140,0,0,0,0,0,0,0,0           NL
·63013 DATA141,5,2,5,0,80,32,80,0        KL
·63014 DATA142,5,2,5,0,80,32,80,0        CA
·63015 DATA143,0,0,0,0,0,0,0,0           MM
·63016 DATA144,0,0,0,0,0,0,0,0           BP
·63017 DATA145,0,0,0,0,0,0,0,0           BO
·63018 DATA146,0,0,0,0,0,0,0,0           AB
·63019 DATA147,192,7,24,7,224,24,7,56    AO
·63020 DATA148,40,84,40,16,214,56,16,0   JN
·63021 DATA149,0,0,0,0,0,0,0,0           GC
·63022 DATA150,255,1,255,32,255,2,255,4  CL
·63023 DATA151,96,96,6,6,192,192,12,12   DL
·63024 DATA152,0,0,0,0,0,0,0,0           NK
·63025 DATA153,0,0,0,0,0,0,0,0           NN
·63026 DATA154,0,0,0,0,0,0,0,0           MM
·63027 DATA155,0,0,0,0,0,0,0,0           BP
·63028 DATA156,0,0,0,0,0,0,0,0           BO
·63029 DATA157,0,0,0,0,0,0,0,0           AB
·63030 DATA158,0,0,0,0,0,0,0,0           PA
·63031 DATA159,0,0,0,0,0,0,0,0           ED
·63032 DATA160,148,244,148,156,148,151,14
8,148                                    OF
·63033 DATA161,136,72,100,18,137,140,66,5
3                                        FB
·63034 DATA162,0,0,0,0,0,0,0,0           ED
·63035 DATA163,0,0,4,251,0,0,32,223      MF
·63036 DATA164,0,0,20,62,28,8,0,0        MH
·63037 DATA165,4,10,66,66,177,72,4,4     JC
·63038 DATA166,2,84,168,1,42,84,128,1    HN
·63039 DATA167,2,84,168,1,42,84,128,1    KO
·63040 DATA168,65,80,20,5,65,80,20,5     GM
·63041 DATA169,192,7,24,7,224,24,7,56    OG
·63042 DATA170,0,0,0,0,0,0,0,0           BO
·63043 DATA171,40,124,40,124,40,124,40,12
4                                        CF
·63044 DATA172,0,0,0,0,0,0,0,0           PA
·63045 DATA173,0,0,0,0,0,0,0,0           ED
·63046 DATA174,0,0,0,0,0,0,0,0           GC
·63047 DATA175,0,0,0,0,0,0,0,0           EF
·63048 DATA176,0,0,0,0,0,0,0,0           NE
·63049 DATA177,0,0,0,0,0,0,0,0           EH
·63050 DATA178,148,47,82,164,79,146,37,74 IJ
·63051 DATA179,69,124,69,84,69,84,71,84  EE
·63052 DATA180,0,0,0,0,0,0,0,0           BP
·63053 DATA181,24,24,48,48,96,96,192,192 FH
·63054 DATA182,192,192,96,96,48,48,24,24 KI
·63055 DATA183,24,24,12,12,6,6,3,3       AI
·63056 DATA184,3,3,6,6,12,12,24,24       OL
·63057 DATA185,0,0,0,192,240,60,15,3     EA
·63058 DATA186,0,0,0,3,15,60,240,192     NB
·63059 DATA187,3,15,60,240,192,0,0,0     JM
·63060 DATA188,192,240,60,15,3,0,0,0     KJ
·63061 DATA189,0,0,0,0,0,0,0,0           EG
·63062 DATA190,0,8,28,34,65,255,255,0    OI
·63063 DATA191,0,255,255,65,34,28,8,0    OP
·63064 DATA192,0,0,0,0,0,0,0,00          DP
·63065 DATA193,60,60,60,60,60,60,60,60   AB
·63066 DATA194,0,0,255,255,255,255,0,0   AA
·63067 DATA195,36,36,36,36,36,36,36,36   ML
·63068 DATA196,0,0,255,0,0,255,0,0       HC
·63069 DATA197,60,60,255,255,255,255,0,0 FA
·63070 DATA198,0,0,255,255,255,255,60,60 NF
·63071 DATA199,0,0,63,63,63,63,60,60     FC
·63072 DATA200,0,0,252,252,252,252,60,60 JN
·63073 DATA201,60,60,252,252,252,252,0,0 KC
·63074 DATA202,60,60,63,63,63,63,0,0     EL
·63075 DATA203,60,60,63,63,63,63,60,60   NJ
·63076 DATA204,60,60,252,252,252,252,60,6
0                                        BI
·63077 DATA205,60,60,255,255;255,255,60,6
0                                        IL
·63078 DATA206,60,63,63,60,60,63,63,60   AO
·63079 DATA207,60,252,252,60,60,252,252,6
0                                        KB
·63080 DATA208,126,126,24,36,36,24,0,0   OE
·63081 DATA209,0,192,220,226,226,220,192,
0                                        OH
·63082 DATA210,255,171,213,171,213,171,21
3,255                                    DC
·63083 DATA211,213,255,195,195,195,195,25
5,171                                    MP
·63084 DATA212,225,179,31,206,92,126,247,
49                                       OC
·63085 DATA213,0,0,0,0,0,0,0,0           GC
```

```
·63086 DATA214,60,60,60,60,60,60,60,60   DF
·63087 DATA215,0,0,255,255,255,255,0,0   KE
·63088 DATA216,36,36,36,36,36,36,36,36   NP
·63089 DATA217,0,0,255,0,0,255,0,0       NG
·63090 DATA218,0,0,0,0,0,0,0,0           IJ
```

MANSION GAME

WARNING: Do not run this program without SAVEing it, preferably twice, because if there is any error in your typing that causes it to crash while RUNning, the only copy you'll ever get is the copy you already SAVEd or the one you type all over again. Cassette users, see the article for line changes.

```
·1 REM SOLVE THE MANSION MURDER--DISPLAY   EC
·2 REM                                     JD
·7 REM                                     JD
·8 REM RELOCATE BASIC VARIABLE STORAGE     MD
·9 REM                                     JD
·10 POKE 32766,PEEK(45):POKE 32767,PEEK(4
 6):POKE 45,0:POKE 46,128                  IJ
·12 REM                                    JD
·13 REM HAS SCREEN BEEN LOADED?            BL
·14 REM                                    JD
·15 IF PEEK(31744)=26 AND PEEK(31748)=152
 THEN 20                                   HK
·16 POKE 47,0:POKE 48,128:POKE 49,0:POKE
 50,128:GOSUB 50000                        CN
·20 GOSUB 1000                             FO
·27 REM                                    JD
·28 REM MOVE VIDEO MEMORY TO MANSION       BM
·29 REM                                    JD
·30 WQ=PEEK(56578):XQ=PEEK(56576):POKE 56
 578,WQ OR 3:POKE 56576,XQ AND 272 OR VM   KF
·35 POKE VR,DM(0):POKE BR,DB(0):P=0:T=0    BK
·40 GOSUB 450                              DB
·45 GOSUB 400:I=FRE(9)                     IN
·97 REM                                    JD
·98 REM MOVEMENT LOOP                      DE
·99 REM                                    JD
·100 VD=VM(PEEK(197)):HD=HM(PEEK(653)):IF
 HD=0 AND VD=0 THEN 100                    AH
·102 REM                                   JD
·103 REM SPECIAL COMMAND HANDLER           LH
·104 REM                                   JD
·105 IF VD=2 THEN T=75:GOTO 180            HJ
·106 IF VD=3 THEN 800                      GD
·107 REM                                   JD
·108 REM CHECK WHERE FIGURE WILL BE        NO
·109 REM                                   JD
·110 V(P)=V(P)+VD:H(P)=H(P)+HD             EA
·111 XC(P)=PEEK(DA(PW(P))+H(P)+40*V(P))-1
 28                                        PG
·112 REM                                   JD
·113 REM IS IT A SECRET PASSAGE?           AF
·114 REM                                   JD
·115 IF XC(P)>85 THEN 600                  EA
·117 REM                                   JD
·118 REM IS IT A STAIR-END?                PE
·119 REM                                   JD
·120 IF (XC(P)=62 OR XC(P)=63) AND PR(P)=
 1 THEN 300                                MB
·122 REM                                   JD
·123 REM CAN OBJECT BE MOVED THROUGH?      GO
·124 REM                                   JD
·125 IF XC(P)>61 OR XC(P)=0 THEN V(P)=XV(
 P):H(P)=XH(P):XC(P)=PR(P):GOTO 100        JI
·126 IF V(P)>22 OR V(P)<1 THEN 250         KD
·127 REM                                   JD
·128 REM MOVING OFF THE EDGE?              LB
·129 REM                                   JD
·130 IF H(P)>38 OR H(P)<1 THEN 200         KB
·131 IF V(P)>22 OR V(P)<1 THEN 250         KD
·137 REM                                   JD
·138 REM PUT BACK OLD FLOOR,GET NEW        EN
·139 REM                                   JD
·140 PRINT V$(XV(P))TAB(XH(P))XC$(P);:XC$
 (P)=CH$(XC(P))                            ED
·142 REM                                   JD
·143 REM PUT FIGURE IN NEW SPOT            EI
·144 REM                                   JD
·145 PRINT V$(V(P))TAB(H(P))PF$(P);        NC
·167 REM                                   JD
·168 REM IF NEW ROOM, PRINT NAME           EC
·169 REM                                   JD
·170 IF PR(P)<>XC(P) THEN GOSUB 460        BK
·177 REM                                   JD
·178 REM IS PLAYER'S TURN OVER?            CF
·179 REM                                   JD
·180 T=T+1:IF T>75 THEN GOSUB 500          FN
·190 XH(P)=H(P):XV(P)=V(P):GOTO 100        PG
·197 REM                                   JD
·198 REM HORIZONTAL MOVE TO NEW SCREEN     FB
·199 REM                                   JD
·200 PQ=3:IF H(P)<1 THEN PQ=4              DO
·205 IF PW(P)=W(PW(P),PQ) THEN H(P)=XH(P)
 :V(P)=XV(P):GOTO 100                      IP
·210 IF H(P)<1 AND PW(P)=4 THEN V(P)=6     NB
·211 IF H(P)>38 AND PW(P)=5 THEN V(P)=16   KK
·215 IF H(P)<1 THEN H(P)=38:GOTO 270       EE
·220 H(P)=1:GOTO 270                       CD
·247 REM                                   JD
·248 REM VERTICAL MOVE TO NEW SCREEN       NM
·249 REM                                   JD
·250 PQ=2:IF V(P)<1 THEN PQ=1              GM
·255 IF PW(P)=W(PW(P),PQ) THEN H(P)=XH(P)
 :V(P)=XV(P):GOTO 100                      IP
·260 IF V(P)<1 THEN V(P)=22:GOTO 270       PB
·265 V(P)=1:GOTO 270                       CB
·267 REM                                   JD
·268 REM GET NEW SCREEN NUMBER             BD
·269 REM                                   JD
·270 PW(P)=W(PW(P),PQ)                     KJ
·277 REM                                   JD
·278 REM GO INITIALIZE SCREEN              NM
·279 REM                                   JD
·280 GOSUB 900                             DB
·290 GOTO 190                              CK
```

```
•297 REM                                          JD
•298 REM STAIRWAY HANDLER                         BM
•299 REM                                          JD
•300 IF PW(P)=11 THEN PW(P)=6:V(P)=7:H(P)
 =17:GOSUB 900:GOTO 190                           FI
•310 IF PW(P)=8 AND XH(P)>12 THEN PW(P)=0
 :V(P)=14:H(P)=16:GOSUB 900:GOTO 190              CC
•315 IF PW(P)=8 THEN PW(P)=2:V(P)=21:H(P)
 =9:GOSUB 900:GOTO 190                            MJ
•320 IF PW(P)=7 THEN PW(P)=1:V(P)=3:H(P)=
 23:GOSUB 900:GOTO 190                            BJ
•330 IF PW(P)=6 THEN PW(P)=11:V(P)=19:H(P
 )=16:GOSUB 900:GOTO 190                          PD
•340 IF PW(P)=5 THEN PW(P)=1:V(P)=15:H(P)
 =23:GOSUB 900:GOTO 190                           GA
•350 IF PW(P)=4 THEN PW(P)=2:V(P)=20:H(P)
 =16:GOSUB 900:GOTO 190                           AC
•360 IF PW(P)=2 AND XH(P)>12 THEN PW(P)=4
 :V(P)=10:H(P)=15:GOSUB 900:GOTO 190              IL
•365 IF PW(P)=2 THEN PW(P)=8:V(P)=21:H(P)
 =7:GOSUB 900:GOTO 190                            HH
•370 IF PW(P)=1 AND XV(P)>9 THEN PW(P)=5:
 V(P)=3:H(P)=23:GOSUB 900:GOTO 190                ED
•375 IF PW(P)=1 THEN PW(P)=7:V(P)=16:H(P)
 =23:GOSUB 900:GOTO 190                           MD
•380 IF PW(P)=0 THEN PW(P)=8:V(P)=20:H(P)
 =16:GOSUB 900:GOTO 190                           NM
•390 H(P)=XH(P):V(P)=XV(P):GOTO 100               JM
•397 REM                                          JD
•398 REM UN-LINK SCREEN LINES                     ON
•399 REM                                          JD
•400 FOR I=217 TO 242:POKE I,PEEK(I)OR 12
 8:NEXT:RETURN                                    MJ
•447 REM                                          JD
•448 REM RE-PRINT FIGURES ON SCREEN               JB
•449 REM                                          JD
•450 FOR I=0 TO NP:IF PW(I)=PW(P) THEN PR
 INT V$(V(I))TAB(H(I))PF$(I);                     EJ
•455 NEXT                                         IA
•460 PR(P)=XC(P):PRINT "[RVSOFF]"V$(24)BL
 $V$(24)NM$(PR(P))V$(24)TAB(27)"PLAYER "P
 +1"[RVSON]";                                     KJ
•465 RETURN                                       IM
•497 REM                                          JD
•498 REM CHANGE PLAYERS                           JB
•499 REM                                          JD
•500 T=0:P=P+1:IF P>NP THEN P=0                   AP
•505 POKE BR,YQ:PRINT "[CLEAR]":GOSUB 400         BD
•510 POKE BR,DB(PW(P)):POKE VR,DM(PW(P)):
 PRINT V$(24)BL$;                                 IF
•520 PRINT V$(24)"[RVSOFF]"NM$(PR(P))V$(2
 4)TAB(28)"PLAYER "P+1"[RVSON]";                  IB
•530 FOR I=0 TO 2000:NEXT:POKE 197,64:POK
 E 653,0                                          OJ
•540 GOSUB 450:RETURN                             PI
•597 REM                                          JD
•598 REM MOVE THROUGH SECRET PASSAGES             PG
•599 REM                                          JD
•600 IF PW(P)=3 THEN PW(P)=10:V(P)=5:H(P)
 =14:GOSUB 900:GOTO 190                           OH
•601 IF PW(P)=10 AND H(P)<18 THEN PW(P)=3
 :V(P)=22:H(P)=29:GOSUB 900:GOTO 190              MP
•602 IF PW(P)=6 THEN PW(P)=5:V(P)=10:H(P)
 =20:GOSUB 900:GOTO 190                           AJ
•603 IF PW(P)=5 AND XH(P)<22 THEN PW(P)=6
 :V(P)=3:H(P)=14:GOSUB 900:GOTO 190               PD
•604 IF PW(P)=5 AND V(P)<4 THEN PW(P)=8:V
 (P)=7:H(P)=5:GOSUB 900:GOTO 190                  AE
•605 IF PW(P)=8 AND XV(P)=6 THEN PW(P)=5:
 V(P)=2:H(P)=37:GOSUB 900:GOTO 190                NM
•610 ON SP GOTO 620,670,720                       BO
•615 V(P)=XV(P):H(P)=XH(P):GOTO 100               DI
•620 IF PW(P)=11 AND PR(P)=52 THEN PW(P)=
 8:V(P)=22:H(P)=3:GOSUB 900:GOTO 190              JI
•621 IF PW(P)=11 THEN PW(P)=11:H(P)=21:GO
 SUB 900:GOTO 190                                 LI
•622 IF PW(P)=9 AND PR(P)=4 THEN PW(P)=4:
 V(P)=8:H(P)=2:GOSUB 900:GOTO 190                 NB
•623 IF PW(P)=10 AND PR(P)=4 THEN PW(P)=1
 :V(P)=13:H(P)=28:GOSUB 900:GOTO 190              NO
•624 IF PW(P)=4 THEN PW(P)=11:V(P)=8:H(P)
 =3:GOSUB 900:GOTO 190                            NI
•625 IF PW(P)=9 THEN PW(P)=5:V(P)=9:H(P)=
 36:GOSUB 900:GOTO 190                            JF
•626 IF PW(P)=7 THEN PW(P)=10:V(P)=6:H(P)
 =38:GOSUB 900:GOTO 190                           NG
•627 IF PW(P)=10 THEN PW(P)=11:V(P)=6:H(P
 )=31:GOSUB 900:GOTO 190                          NJ
•628 IF PW(P)=5 AND XH(P)>32 THEN PW(P)=7
 :V(P)=6:H(P)=8:GOSUB 900:GOTO 190                IH
•629 IF PW(P)=1 THEN PW(P)=9:V(P)=16:H(P)
 =25:GOSUB 900:GOTO 190                           KH
•630 IF PW(P)=8 AND PR(P)=41 THEN PW(P)=3
 :V(P)=5:H(P)=7:GOSUB 900:GOTO 190                EP
•650 V(P)=XV(P):H(P)=XH(P):GOTO 100               DI
•670 IF PW(P)=11 AND PR(P)=52 THEN PW(P)=
 9:V(P)=2:H(P)=2:GOSUB 900:GOTO 190               MD
•671 IF PW(P)=11 THEN PW(P)=11:H(P)=21:GO
 SUB 900:GOTO 190                                 LI
•672 IF PW(P)=9 AND PR(P)=4 THEN V(P)=13:
 GOSUB 900:GOTO 190                               HN
•673 IF PW(P)=10 AND PR(P)=4 THEN PW(P)=5
 :V(P)=9:H(P)=37:GOSUB 900:GOTO 190               MO
•674 IF PW(P)=4 THEN PW(P)=10:V(P)=17:H(P
 )=12:GOSUB 900:GOTO 190                          AC
•675 IF PW(P)=9 THEN PW(P)=0:V(P)=5:H(P)=
 16:GOSUB 900:GOTO 190                            HE
•676 IF PW(P)=7 THEN PW(P)=1:V(P)=12:H(P)
 =27:GOSUB 900:GOTO 190                           CD
•677 IF PW(P)=10 THEN PW(P)=8:V(P)=17:H(P
 )=2:GOSUB 900:GOTO 190                           EA
•678 IF PW(P)=5 AND XH(P)>32 THEN PW(P)=1
 1:V(P)=22:H(P)=27:GOSUB 900:GOTO 190             LE
•679 IF PW(P)=1 THEN PW(P)=7:V(P)=6:H(P)=
 12:GOSUB 900:GOTO 190                            AC
•680 IF PW(P)=8 AND PR(P)=41 THEN PW(P)=7
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:V(P)=2:H(P)=27:GOSUB 900:GOTO 190       MI
•700 V(P)=XV(P):H(P)=XH(P):GOTO 100       DI
•720 IF PW(P)=11 AND PR(P)=52 THEN PW(P)=
 5:V(P)=9:H(P)=37:GOSUB 900:GOTO 190      GP
•721 IF PW(P)=11 THEN PW(P)=11:H(P)=21:GO
 SUB 900:GOTO 190                         LI
•722 IF PW(P)=9 AND PR(P)=4 THEN PW(P)=7:
 V(P)=6:H(P)=12:GOSUB 900:GOTO 190        EM
•723 IF PW(P)=10 AND PR(P)=4 THEN V(P)=6:
 GOSUB 900:GOTO 190                       FP
•724 IF PW(P)=4 THEN PW(P)=9:V(P)=2:H(P)=
 27:GOSUB 900:GOTO 190                    KD
•725 IF PW(P)=9 THEN PW(P)=8:V(P)=10:H(P)
 =15:GOSUB 900:GOTO 190                   HB
•726 IF PW(P)=7 THEN PW(P)=10:V(P)=2:H(P)
 =12:GOSUB 900:GOTO 190                   JO
•727 IF PW(P)=10 THEN PW(P)=9:V(P)=17:H(P
 )=2:GOSUB 900:GOTO 190                   OB
•728 IF PW(P)=5 AND XH(P)>32 THEN PW(P)=8
 :V(P)=18:H(P)=3:GOSUB 900:GOTO 190       NE
•729 IF PW(P)=1 THEN PW(P)=4:V(P)=7:H(P)=
 2:GOSUB 900:GOTO 190                     HG
•730 IF PW(P)=8 AND PR(P)=41 THEN PW(P)=1
 1:V(P)=22:H(P)=21:GOSUB 900:GOTO 190     IC
•750 V(P)=XV(P):H(P)=XH(P):GOTO 100       DI
•797 REM                                  JD
•798 REM ENDING ROUTINE                   HC
•799 REM                                  JD
•800 POKE BR,YQ:PRINT "[CLEAR]DO YOU WANT
  TO END THIS GAME? (Y OR N)"             FE
•805 POKE VR,ZQ:POKE 56578,PEEK(56578)OR
 3:POKE 56576,XQ                          MG
•810 FOR I=0 TO 2000:NEXT:POKE 198,0:POKE
  197,64                                  PP
•820 VD=PEEK(197):IF VD=64 THEN 820       AH
•825 IF VD=25 THEN 850                    IC
•830 WQ=PEEK(56578):XQ=PEEK(56576):POKE 5
 6578,WQ OR 3:POKE 56576,XQ AND 272 OR VM KF
•835 POKE VR,DM(PW(P)):POKE BR,DB(PW(P))  LG
•840 GOSUB 450                            DB
•845 GOTO 190                             CK
•850 PRINT "DO YOU WANT TO START A NEW GA
 ME?[8" "]Y OR N)"                        AF
•855 FOR I=0 TO NP:POKE BR,DB(PW(I)):PRIN
 T V$(XV(I))TAB(XH(I))"[RVSON]"XC$(I);:NE
 XT                                       FL
•860 POKE BR,YQ                           AD
•865 FOR I=0 TO 2000:NEXT:POKE 198,0:POKE
  197,64                                  PP
•870 VD=PEEK(197):IF VD=64 OR (VD<>25 AND
  VD<>39) THEN 870                        OP
•875 IF VD=25 THEN GOSUB 1120:GOTO 30     IP
•890 POKE 31744,UQ:POKE 31748,VQ:POKE 45,
 PEEK(31744):POKE 46,PEEK(31748)          KI
•895 POKE 792,71:POKE 808,237:PRINT "[CLE
 AR]THANKS FOR PLAYING!":CLR:END          HB
•897 REM                                  JD
•898 REM INITIALIZE NEW SCREEN            DC
•899 REM                                  JD
•900 PRINT V$(XV(P))TAB(XH(P))XC$(P);     MC
•902 REM                                  JD
•903 REM RESET COLOR MEMORY               GC
•904 REM                                  JD
•905 POKE BR,YQ:PRINT "[CLEAR]":GOSUB 400 BD
•907 REM                                  JD
•908 REM GET TO NEW SCREEN                PD
•909 REM                                  JD
•910 POKE VR,DM(PW(P)):POKE BR,DB(PW(P))  LG
•912 REM                                  JD
•913 REM GET NEW FLOOR                    OK
•914 REM                                  JD
•915 XC(P)=PEEK(DA(PW(P))+H(P)+40*V(P))-1
 28:IF XC(P)>0 AND XC(P)<62 THEN 930      JE
•920 H(P)=H(P)+1+38*(H(P)>37):V(P)=V(P)+1
 +22*(V(P)>21):GOTO 915                   JA
•930 XC$(P)=CH$(XC(P)):GOSUB 450:RETURN   MF
•997 REM                                  JD
•998 REM SET UP TABLES                    AM
•999 REM                                  JD
•1000 DIM W(11,6),HM(7),VM(64),MT(2,2),V$
 (24),CH$(63),NM$(63)                     ML
•1005 DIM V(5),SH(5),H(5),XH(5),XV(5),PW(
 5),XC(5),PR(5),PF$(5),XC$(5)             GJ
•1007 REM                                 JD
•1008 REM VERTICAL KEYSTROKE TABLE        BL
•1009 REM                                 JD
•1010 FOR I=0 TO 64:VM(I)=0:NEXT:VM(6)=-1
 :VM(3)=1:VM(1)=3:VM(60)=2                PM
•1017 REM                                 JD
•1018 REM HORIZONTAL KEYSTROKE TABLE      EE
•1019 REM                                 JD
•1020 FOR I=0 TO 7:HM(I)=0:NEXT:HM(1)=1:H
 M(2)=-1:HM(3)=-1                         LL
•1027 REM                                 JD
•1028 REM VERTICAL PRINT TABLE            OB
•1029 REM                                 JD
•1030 V$(0)="[HOME]":FOR I=1 TO 24:V$(I)=
 V$(I-1)+"[DOWN]":NEXT                    HE
•1047 REM                                 JD
•1048 REM WING TABLE                      FE
•1049 REM                                 JD
•1050 FOR I=0 TO 11:FOR K=0 TO 4:READ A:W
 (I,K)=A:NEXT:NEXT                        FH
•1060 DATA 0,2,0,0,1                      DA
•1061 DATA 1,3,1,0,1                      DP
•1062 DATA 2,2,0,2,3                      CO
•1063 DATA 3,3,1,2,3                      DF
•1064 DATA 4,4,4,4,5                      DK
•1065 DATA 5,5,5,4,5                      DJ
•1066 DATA 6,8,6,6,7                      DO
•1067 DATA 7,7,7,6,7                      FL
•1068 DATA 8,8,6,8,8                      FN
•1069 DATA 9,11,9,9,10                    MO
•1070 DATA 10,10,10,9,10                  AE
•1071 DATA 11,11,9,11,11                  AI
•1072 REM                                 JD
```

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·1073 REM SCREEN CODE/ASCII CONVERSION    ML
·1074 REM                                 JD
·1075 FOR I=0 TO 31:CH$(I)=CHR$(I+64):NEX
T:FOR I=32 TO 63:CH$(I)=CHR$(I):NEXT      PN
·1076 FOR I=0 TO 63:CH$(I)="[RVSON]"+CH$(
I)+"[RVSOFF]":NEXT                        KP
·1077 REM                                 JD
·1078 REM ROOM NAME TABLE                 IF
·1079 REM                                 JD
·1080 FOR I=1 TO 52:READ A$:NM$(I)=A$:NEX
T:FOR I=53 TO 61:NM$(I)="DOORWAY":NEXT    MK
·1081 NM$(62)=NM$(1):NM$(63)=NM$(1)       LH
·1082 DATA "STAIRWAY","WATER CLOSET","CLO
SET","CRAWL SPACE","PORTICO","PORCH"      NK
·1083 DATA "LAWN","BALCONY","HALLWAY","PA
RLOR","DINING ROOM","CONSERVATORY"        CJ
·1084 DATA "KITCHEN","LAUNDRY","PANTRY","
FAMILY PARLOR","BALL ROOM","STUDY"        BH
·1085 DATA "LIBRARY","TEA GARDEN","GREENH
OUSE","DECK","HOT TUB","GARAGE"           HI
·1086 DATA "BILLIARD ROOM","DEN","WORKSHO
P","FURNACE ROOM","CHAUFFER'S ROOM"       AE
·1087 DATA "MAID'S ROOM","BUTLER'S ROOM",
"SAUNA","TAPESTRY ROOM"," "               HL
·1088 DATA "WYETH ROOM","NURSERY","PICASS
O ROOM","VERMEER ROOM","DRESSING ROOM"    GP
·1089 DATA "VAN GOGH ROOM","LIBRARY BALCO
NY","COMPUTER ROOM","TRAIN ROOM"          HI
·1090 DATA "PLAY ROOM","FREDDY'S ROOM","C
ECIL'S ROOM","AMY'S ROOM"                 BF
·1091 DATA "GOVERNESS'S CUPBOARD","SCHOOL
 ROOM","STUDIO","HIGH BALCONY"            GB
·1092 DATA "SECRET ROOM"                  AL
·1097 REM                                 JD
·1098 REM SET INITIAL VALUES              GH
·1099 REM                                 JD
·1100 FOR I=0 TO 5:PF$(I)="[RVSON]@[RVSOF
F][c 2]":NEXT:FOR I=0 TO 5:READ A$:PF$(I
)=A$+PF$(I):NEXT                          CG
·1105 DATA "[c 1]","[c 4]","[GREEN]","[c
7]","[RED]","[c 8]"                       IH
·1110 BL$="[37" "]"                       OI
·1115 FOR I=0 TO 5:READ A:SH(I)=A:NEXT    KK
·1116 DATA 5,9,13,17,21,25                HG
·1120 FOR I=0 TO 5:H(I)=SH(I):V(I)=15:PW(
I)=0:XH(I)=H(I):XV(I)=V(I):NEXT           NB
·1125 FOR I=0 TO 5:XC(I)=PEEK(DA(PW(I))+H
(I)+40*V(I))-128:XC$(I)=CH$(XC(I)):NEXT   BG
·1127 REM                                 JD
·1128 REM GET PLAYER NUMBER               BI
·1129 REM                                 JD
·1130 PRINT V$(24)"HOW MANY PLAYERS?  (1-
6)[13" "]";:POKE 197,64:POKE 198,0        JM
·1135 GET A$:IF A$="" THEN 1135           NM
·1140 IF ASC(A$)<49 OR ASC(A$)>54 THEN 11
35                                        LJ
·1145 NP=VAL(A$)-1:PRINT V$(24)BL$V$(24)N
P+1" PLAYERS--IS THIS RIGHT? (Y OR N)";   HP
·1150 POKE 197,64:POKE 198,0              LJ
·1155 GET A$:IF A$="" THEN 1155           NO
·1160 IF A$<>"Y" THEN 1130                HB
·1170 SP=1+INT(3*RND(9)):IF SP<1 OR SP>3
THEN 170                                  KM
·1180 POKE 792,193:POKE 808,239           GD
·1185 FOR I=23 TO 0 STEP-1:PRINT V$(I)TAB
(39)"!";:NEXT                             EH
·1190 RETURN                              IM
·49997 REM                                JD
·49998 REM SET UP DISPLAY                 EA
·49999 REM                                JD
·50000 DIM DB(11),DM(11),DA(11):POKE 5328
1,7:POKE 53280,11:POKE 657,128            DP
·50005 UQ=PEEK(32766):VQ=PEEK(32767)      PP
·50007 REM                                JD
·50008 REM SET UP COLOR MEMORY            HO
·50009 REM                                JD
·50010 PRINT "[c 2][CLEAR]";:FOR I=0 TO 2
3:PRINT"PLEASE FIND THE MURDERER IN THE
MANSION"                                  AB
·50020 NEXT                               IA
·50027 REM                                JD
·50028 REM SET VIDEO MEM & CHAR MEM       NB
·50029 REM                                JD
·50030 VM=2:VB=16384:CM=14:CB=VB+CM*1024:
FOR I=0 TO 11:DM(I)=CM+16*(I+2):NEXT      IG
·50040 VR=53272:ZQ=PEEK(VR)               JH
·50047 REM                                JD
·50048 REM SET BASIC POINTERS             IN
·50049 REM                                JD
·50050 FOR I=0 TO 11:DB(I)=INT((VB+1024*(
I+2))/256):NEXT                           CK
·50055 FOR I=0 TO 11:DA(I)=DB(I)*256:NEXT OO
·50060 BR=648:YQ=PEEK(BR)                 FO
·50067 REM                                JD
·50068 REM GET OLD VIDEO POINTERS         GA
·50069 REM                                JD
·50070 WQ=PEEK(56578):XQ=PEEK(56576)      KI
·50077 REM                                JD
·50078 REM SET LOAD FLAG                  OG
·50079 REM                                JD
·50080 Q9=Q8                              ND
·50088 REM GET SCREEN DISPLAY & CHAR SET  GD
·50089 REM                                JD
·50090 LOAD "DISPLAY DATA",8,1            CI
·50093 REM                                JD
·50094 REM NOTE: LOADING SENDS PROGRAM BA
CK TO BEGINNING                           LM
·50095 REM                                JD
·50099 REM                                JD
```

IMPORTANT! Letters on white background are **Bug Repellent** line codes. **Do not enter them!** Pages 63 and 64 explain these codes and provide other essential information on entering ***Ahoy!*** programs. Refer to these pages **before** entering any programs!

PROGRAMMABLE *Functions*

FROM PAGE 23

```
•10 POKE53280,0:POKE53281,11:GOTO 1000     FC
•100 PRINT TAB(20)"[PURPLE][RVSON][3" "][
 c 8][7" "]"                               KG
•110 PRINT TAB(20)"[PURPLE][RVSON][3" "][
 c 8] F "I  "                              LP
•120 PRINT TAB(20)"[PURPLE][RVSON][3" "][
 c 8][7"[c @]"]"                           CK
•130 PRINT TAB(20)"[PURPLE][RVSON][3" "][
 c 8] F "I+1  "                            HG
•140 PRINT TAB(20)"[PURPLE][RVSON][3" "][
 c 8][7" "]"                               KG
•150 PRINT TAB(20)"[BLACK][RVSON][11"[c Y
 ]"]"                                      NO
•160 RETURN                                IM
•1000 PRINT CHR$(147);:POKE53272,23:FOR I
 =1TO7 STEP2:GOSUB100:NEXT                 PO
•2000 PRINT"[HOME][WHITE][4"[DOWN]"][RIGH
 T][RIGHT][s P][DOWN][s R][DOWN][s O][DOW
 N][s G][DOWN][s R][DOWN][s A][DOWN][s M]
 [DOWN][DOWN][4"[LEFT]"][s N][DOWN][s O][
 DOWN][s W]"                               KM
•3000 PRINT"[3"[DOWN]"][4"[RIGHT]"][s L][
 s O][s A][s D][s I][s N][s G]:[DOWN][8"[
 LEFT]"][8"[c T]"]"Y.                      FO
•10000 REM ** DISPLAY & DEFINE ROUTINE *   MK
•10010 I=36864                             BL
•10020 READ A:IF A=256 THEN 50000          PG
•10030 POKE I,A:I=I+1:GOTO 10020           KA
•36864 DATA 56,32,240,255,142,58,3,140     LC
•36872 DATA 57,3,162,0,189,0,4,157         GN
•36880 DATA 0,156,232,208,247,162,0,189    JB
•36888 DATA 0,5,157,0,157,232,208,247      OI
•36896 DATA 162,0,189,0,6,157,0,158        ME
•36904 DATA 232,208,247,162,0,189,0,7      GH
•36912 DATA 157,0,159,232,208,247,32,76    HI
•36920 DATA 150,169,5,141,33,208,141,32    CA
•36928 DATA 208,169,13,141,134,2,169,147   CL
•36936 DATA 32,210,255,162,4,160,10,24     PF
•36944 DATA 32,240,255,162,0,189,114,150   AN
•36952 DATA 240,7,32,210,255,232,76,85     OO
•36960 DATA 144,162,5,160,10,24,32,240     NG
•36968 DATA 255,162,20,169,163,32,210,255  MC
•36976 DATA 202,208,250,162,3,160,10,24    JB
•36984 DATA 32,240,255,162,20,169,114,32   KC
•36992 DATA 210,255,202,208,250,162,8,160  MD
•37000 DATA 4,24,32,240,255,162,0,189      OH
•37008 DATA 73,151,240,7,32,210,255,232    JJ
•37016 DATA 76,143,144,162,0,189,176,207   OL
•37024 DATA 32,210,255,232,224,10,208,245  PA
•37032 DATA 162,9,160,4,24,32,240,255      IL
•37040 DATA 162,14,169,163,32,210,255,202  EB
•37048 DATA 208,250,162,8,160,24,24,32     CO
•37056 DATA 240,255,162,0,189,78,151,240   FK
•37064 DATA 7,32,210,255,232,76,196,144    DA
•37072 DATA 162,0,189,216,207,32,210,255   BM
•37080 DATA 232,224,10,208,245,162,9,160   NB
•37088 DATA 24,24,32,240,255,162,14,169    LH
•37096 DATA 163,32,210,255,202,208,250,16
 2                                         CG
•37104 DATA 10,160,4,24,32,240,255,162     LA
•37112 DATA 0,189,83,151,240,7,32,210      HO
•37120 DATA 255,232,76,249,144,162,0,189   DG
•37128 DATA 186,207,32,210,255,232,224,10  AH
•37136 DATA 208,245,162,11,160,4,24,32     FA
•37144 DATA 240,255,162,14,169,163,32,210  ED
•37152 DATA 255,202,208,250,162,10,160,24  OD
•37160 DATA 24,32,240,255,162,0,189,88     IC
•37168 DATA 151,240,7,32,210,255,232,76    MC
•37176 DATA 46,145,162,0,189,226,207,32    LN
•37184 DATA 210,255,232,224,10,208,245,16
 2                                         FB
•37192 DATA 11,160,24,24,32,240,255,162    AL
•37200 DATA 14,169,163,32,210,255,202,208  CA
•37208 DATA 250,162,12,160,4,24,32,240     FB
•37216 DATA 255,162,0,189,93,151,240,7     MP
•37224 DATA 32,210,255,232,76,99,145,162   IM
•37232 DATA 0,189,196,207,32,210,255,232   CN
•37240 DATA 224,10,208,245,162,13,160,4    NO
•37248 DATA 24,32,240,255,162,14,169,163   LM
•37256 DATA 32,210,255,202,208,250,162,12  JK
•37264 DATA 160,24,24,32,240,255,162,0     EN
•37272 DATA 189,98,151,240,7,32,210,255    DF
•37280 DATA 232,76,152,145,162,0,189,236   BN
•37288 DATA 207,32,210,255,232,224,10,208  JM
•37296 DATA 245,162,13,160,24,24,32,240    HI
•37304 DATA 255,162,14,169,163,32,210,255  HH
•37312 DATA 202,208,250,162,14,160,4,24    AA
•37320 DATA 32,240,255,162,0,189,103,151   AO
•37328 DATA 240,7,32,210,255,232,76,205    CG
•37336 DATA 145,162,0,189,206,207,32,210   LB
•37344 DATA 255,232,224,10,208,245,162,15  DN
•37352 DATA 160,4,24,32,240,255,162,14     HO
•37360 DATA 169,163,32,210,255,202,208,25
 0                                         AL
•37368 DATA 162,14,160,24,24,32,240,255    NG
•37376 DATA 162,0,189,108,151,240,7,32     GD
•37384 DATA 210,255,232,76,2,146,162,0     MD
•37392 DATA 189,246,207,32,210,255,232,22
 4                                         MM
•37400 DATA 10,208,245,162,15,160,24,24    HA
•37408 DATA 32,240,255,162,14,169,163,32   CB
•37416 DATA 210,255,202,208,250,162,18,16
 0                                         KB
•37424 DATA 3,24,32,240,255,162,0,189      GE
•37432 DATA 135,150,240,7,32,210,255,232   KO
•37440 DATA 76,55,146,162,19,160,8,24      GL
•37448 DATA 32,240,255,162,0,189,172,150   MJ
•37456 DATA 240,7,32,210,255,232,76,77     ON
•37464 DATA 146,32,228,255,240,251,201,48  MO
```

```
•37472 DATA 240,35,201,49,240,34,201,50 MF
•37480 DATA 240,33,201,51,240,32,201,52 BK
•37488 DATA 240,31,201,53,240,30,201,54 CO
•37496 DATA 240,29,201,55,240,28,201,56 NK
•37504 DATA 240,27,76,89,146,76,96,149 JK
•37512 DATA 76,160,146,76,248,146,76,80 KK
•37520 DATA 147,76,168,147,76,0,148,76 PL
•37528 DATA 88,148,76,176,148,76,8,149 EI
•37536 DATA 32,180,149,162,0,169,32,157 FD
•37544 DATA 176,207,232,224,10,208,248,16
2 JC
•37552 DATA 0,142,55,3,32,228,255,240 IG
•37560 DATA 251,201,13,240,22,174,55,3 PA
•37568 DATA 32,210,255,157,176,207,238,55 HG
•37576 DATA 3,174,55,3,224,10,240,3 DE
•37584 DATA 76,180,146,173,55,3,201,10 OF
•37592 DATA 240,23,32,53,150,32,228,255 GD
•37600 DATA 240,251,201,78,240,11,201,89 AP
•37608 DATA 208,243,169,13,162,9,157,176 FJ
•37616 DATA 207,169,0,133,212,76,70,144 KM
•37624 DATA 32,180,149,162,0,169,32,157 FD
•37632 DATA 216,207,232,224,10,208,248,16
2 EL
•37640 DATA 0,142,55,3,32,228,255,240 IG
•37648 DATA 251,201,13,240,22,174,55,3 PA
•37656 DATA 32,210,255,157,216,207,238,55 IF
•37664 DATA 3,174,55,3,224,10,240,3 DE
•37672 DATA 76,12,147,173,55,3,201,10 EF
•37680 DATA 240,23,32,53,150,32,228,255 GD
•37688 DATA 240,251,201,78,240,11,201,89 AP
•37696 DATA 208,243,169,13,162,9,157,216 FI
•37704 DATA 207,169,0,133,212,76,70,144 KM
•37712 DATA 32,180,149,162,0,169,32,157 FD
•37720 DATA 186,207,232,224,10,208,248,16
2 AB
•37728 DATA 0,142,55,3,32,228,255,240 IG
•37736 DATA 251,201,13,240,22,174,55,3 PA
•37744 DATA 32,210,255,157,186,207,238,55 GN
•37752 DATA 3,174,55,3,224,10,240,3 DE
•37760 DATA 76,100,147,173,55,3,201,10 DA
•37768 DATA 240,23,32,53,150,32,228,255 GD
•37776 DATA 240,251,201,78,240,11,201,89 AP
•37784 DATA 208,243,169,13,162,9,157,186 JA
•37792 DATA 207,169,0,133,212,76,70,144 KM
•37800 DATA 32,180,149,162,0,169,32,157 FD
•37808 DATA 226,207,232,224,10,208,248,16
2 JC
•37816 DATA 0,142,55,3,32,228,255,240 IG
•37824 DATA 251,201,13,240,22,174,55,3 PA
•37832 DATA 32,210,255,157,226,207,238,55 PI
•37840 DATA 3,174,55,3,224,10,240,3 DE
•37848 DATA 76,188,147,173,55,3,201,10 CA
•37856 DATA 240,23,32,53,150,32,228,255 GD
•37864 DATA 240,251,201,78,240,11,201,89 AP
•37872 DATA 208,243,169,13,162,9,157,226 FP
•37880 DATA 207,169,0,133,212,76,70,144 KM
•37888 DATA 32,180,149,162,0,169,32,157 FD
•37896 DATA 196,207,232,224,10,208,248,16
2 IA
•37904 DATA 0,142,55,3,32,228,255,240 IG
•37912 DATA 251,201,13,240,22,174,55,3 PA
•37920 DATA 32,210,255,157,196,207,238,55 CA
•37928 DATA 3,174,55,3,224,10,240,3 DE
•37936 DATA 76,20,148,173,55,3,201,10 AD
•37944 DATA 240,23,32,53,150,32,228,255 GD
•37952 DATA 240,251,201,78,240,11,201,89 AP
•37960 DATA 208,243,169,13,162,9,157,196 JH
•37968 DATA 207,169,0,133,212,76,70,144 KM
•37976 DATA 32,180,149,162,0,169,32,157 FD
•37984 DATA 236,207,232,224,10,208,248,16
2 AB
•37992 DATA 0,142,55,3,32,228,255,240 IG
•38000 DATA 251,201,13,240,22,174,55,3 PA
•38008 DATA 32,210,255,157,236,207,238,55 BH
•38016 DATA 3,174,55,3,224,10,240,3 DE
•38024 DATA 76,108,148,173,55,3,201,10 KD
•38032 DATA 240,23,32,53,150,32,228,255 GD
•38040 DATA 240,251,201,78,240,11,201,89 AP
•38048 DATA 208,243,169,13,162,9,157,236 FO
•38056 DATA 207,169,0,133,212,76,70,144 KM
•38064 DATA 32,180,149,162,0,169,32,157 FD
•38072 DATA 206,207,232,224,10,208,248,16
2 HM
•38080 DATA 0,142,55,3,32,228,255,240 IG
•38088 DATA 251,201,13,240,22,174,55,3 PA
•38096 DATA 32,210,255,157,206,207,238,55 GO
•38104 DATA 3,174,55,3,224,10,240,3 DE
•38112 DATA 76,196,148,173,55,3,201,10 AM
•38120 DATA 240,23,32,53,150,32,228,255 GD
•38128 DATA 240,251,201,78,240,11,201,89 AP
•38136 DATA 208,243,169,13,162,9,157,206 GB
•38144 DATA 207,169,0,133,212,76,70,144 KM
•38152 DATA 32,180,149,162,0,169,32,157 FD
•38160 DATA 246,207,232,224,10,208,248,16
2 IA
•38168 DATA 0,142,55,3,32,228,255,240 IG
•38176 DATA 251,201,13,240,22,174,55,3 PA
•38184 DATA 32,210,255,157,246,207,238,55 MC
•38192 DATA 3,174,55,3,224,10,240,3 DE
•38200 DATA 76,28,149,173,55,3,201,10 NG
•38208 DATA 240,23,32,53,150,32,228,255 GD
•38216 DATA 240,251,201,78,240,11,201,89 AP
•38224 DATA 208,243,169,13,162,9,157,246 FN
•38232 DATA 207,169,0,133,212,76,70,144 KM
•38240 DATA 32,95,150,162,0,189,0,156 JF
•38248 DATA 157,0,4,232,208,247,162,0 FD
•38256 DATA 189,0,157,157,0,5,232,208 NF
•38264 DATA 247,162,0,189,0,158,157,0 JK
•38272 DATA 6,232,208,247,162,0,189,0 KG
•38280 DATA 159,157,0,7,232,208,247,162 CE
•38288 DATA 0,173,52,3,157,0,216,157 DN
•38296 DATA 0,217,157,0,218,157,0,219 MK
•38304 DATA 232,208,241,174,58,3,172,57 II
•38312 DATA 3,24,32,240,255,169,128,133 OK
•38320 DATA 157,76,131,164,141,56,3,169 AK
•38328 DATA 147,32,210,255,162,5,160,10 HC
```

```
•38336 DATA 24,32,240,255,162,0,189,197   MN
•38344 DATA 150,240,7,32,210,255,232,76   EP
•38352 DATA 198,149,173,56,3,32,210,255   EL
•38360 DATA 162,7,160,11,24,32,240,255    JG
•38368 DATA 162,0,189,217,150,240,7,32    PP
•38376 DATA 210,255,232,76,226,149,162,9  FE
•38384 DATA 160,7,24,32,240,255,162,0     GJ
•38392 DATA 189,236,150,240,7,32,210,255  BF
•38400 DATA 232,76,248,149,162,10,160,6   JN
•38408 DATA 24,32,240,255,162,0,189,7     FE
•38416 DATA 151,240,7,32,210,255,232,76   MC
•38424 DATA 14,150,162,15,160,15,24,32    NE
•38432 DATA 240,255,162,10,169,163,32,210 NH
•38440 DATA 255,202,208,250,162,14,160,15 NF
•38448 DATA 24,32,240,255,96,162,17,160   CG
•38456 DATA 2,24,32,240,255,162,0,189     BF
•38464 DATA 36,151,240,7,32,210,255,232   IM
•38472 DATA 76,63,150,96,173,134,2,141    CK
•38480 DATA 52,3,173,32,208,141,53,3      BK
•38488 DATA 173,33,208,141,54,3,96,173    AJ
•38496 DATA 52,3,141,134,2,173,53,3       OO
•38504 DATA 141,32,208,173,54,3,141,33    CE
•38512 DATA 208,96,70,85,78,67,84,73      FO
•38520 DATA 79,78,32,68,69,70,73,78       CF
•38528 DATA 73,84,73,79,78,83,0,69        GL
•38536 DATA 78,84,69,82,32,70,85,78       EE
•38544 DATA 67,84,73,79,78,32,78,85       DJ
•38552 DATA 77,66,69,82,32,84,79,32       CB
•38560 DATA 66,69,32,67,72,65,78,71       AG
•38568 DATA 69,68,58,0,91,49,45,56        BJ
•38576 DATA 32,79,82,32,90,69,82,79       FI
•38584 DATA 32,40,48,41,32,84,79,32       OE
•38592 DATA 69,78,68,93,0,82,69,68        MJ
•38600 DATA 69,70,73,78,69,32,70,85       MF
•38608 DATA 78,67,84,73,79,78,32,70       CF
•38616 DATA 0,69,78,84,69,82,32,78        MF
•38624 DATA 69,87,32,67,79,77,77,65       CB
•38632 DATA 78,68,58,0,84,69,78,32        PJ
•38640 DATA 40,49,48,41,32,75,69,89       AN
•38648 DATA 83,84,82,79,75,69,83,32       GG
•38656 DATA 77,65,88,73,85,77,0,40        PM
•38664 DATA 73,78,67,76,85,68,73,78       DB
•38672 DATA 71,32,32,67,65,82,82,73       EO
•38680 DATA 68,71,69,32,82,69,84,85       JM
•38688 DATA 82,78,41,0,68,79,32,89        PE
•38696 DATA 79,85,32,87,65,78,84,32       EA
•38704 DATA 65,32,67,65,82,82,73,68       II
•38712 DATA 71,69,32,82,69,84,85,82       BK
•38720 DATA 78,32,65,68,68,69,68,63       KF
•38728 DATA 0,70,49,58,32,0,70,50         LB
•38736 DATA 58,32,0,70,51,58,32,0         KI
•38744 DATA 70,52,58,32,0,70,53,58        OO
•38752 DATA 32,0,70,54,58,32,0,70         PH
•38760 DATA 55,58,32,0,70,56,58,32        AK
•38768 DATA 0,0,255,0,0,0,128,0           BN
•38776 DATA 0,0,0,0,0,0,0,0               FG
•38784 DATA 120,169,207,141,21,3,169,90   AN
•38792 DATA 141,20,3,169,144,133,56,169   CE
•38800 DATA 0,133,55,88,32,94,166,32      NO
•38808 DATA 68,229,162,10,160,7,24,32     AD
•38816 DATA 240,255,162,0,189,199,151,232 PL
•38824 DATA 32,210,255,201,13,208,245,162 IO
•38832 DATA 15,160,7,24,32,240,255,162    AC
•38840 DATA 0,189,226,151,232,32,210,255  AN
•38848 DATA 201,13,208,245,76,116,164,80  KJ
•38856 DATA 82,79,71,82,65,77,77,65       EK
•38864 DATA 66,76,69,32,70,85,78,67       CP
•38872 DATA 84,73,79,78,32,75,69,89       GA
•38880 DATA 83,13,40,67,41,49,57,56       OD
•38888 DATA 52,59,32,68,69,88,32,84       OE
•38896 DATA 46,32,80,69,84,69,82,83       LO
•38904 DATA 79,78,13,0,0,0,0,0,256        DI
•50000 REM ** IRQ EXTENSION WEDGE **      HK
•50010 I=53082                            AG
•50020 READ A:IF A=256 THEN 60000         PJ
•50030 POKE I,A:I=I+1:GOTO 50020          HM
•53082 DATA 165,197,201,64,208,6,141,161  KN
•53090 DATA 207,76,158,207,205,161,207,24
0                                         PF
•53098 DATA 51,141,161,207,162,3,221,162  PA
•53106 DATA 207,240,5,202,16,248,48,36    JA
•53114 DATA 138,174,141,2,224,1,208,3     EB
•53122 DATA 24,105,4,10,133,251,10,10     MJ
•53130 DATA 24,101,251,168,162,0,185,176  NF
•53138 DATA 207,157,119,2,200,232,224,10  KG
•53146 DATA 208,244,134,198,76,49,234,64  GI
•53154 DATA 4,5,6,3,0,255,255,255         ED
•53162 DATA 255,255,255,255,255,255,76,73 LC
•53170 DATA 83,84,32,32,32,32,32,13       AG
•53178 DATA 80,207,54,53,48,44,49,50      DD
•53186 DATA 56,13,32,76,79,65,68,34       MH
•53194 DATA 32,32,20,20,83,89,83,32       GE
•53202 DATA 52,57,49,53,50,13,82,85       NM
•53210 DATA 78,32,32,32,32,32,32,13       OB
•53218 DATA 80,207,54,53,48,44,48,32      DC
•53226 DATA 32,13,83,65,86,69,34,64       CH
•53234 DATA 48,58,29,157,83,89,83,32      PM
•53242 DATA 51,54,56,54,52,13,256         PA
•60000 POKE53272,21:SYS38784              DM
•61000 OPEN2,8,2,"FKEY,S,W":CMD2:LIST-610
00                                        2
```

Old Routine

FROM PAGE 25

BEFORE ENTERING *OLD ROUTINE*...
you must enter and run ***Flankspeed***, ***Ahoy!***'s machine language entry program. See introduction and program on page 64.

```
8000:  A2  9F  A0  00  84  FB  86  FC  E6
8008:  E6  FC  E8  B1  FB  91  FB  C8  D8
8010:  D0  F9  E0  BF  D0  F2  A5  01  E5
8018:  29  FE  85  01  4F  4C  C4  A2  C9
8020:  00  BD  1C  80  9D  BE  A0  E8  60
8028:  E0  03  D0  F5  A9  37  8D  1C  5D
8030:  A0  A9  80  8D  1D  A0  60  00  A6
8038:  A2  05  BD  00  08  F0  04  E8  83
```

IMPORTANT! Letters on white background are **Bug Repellent** line codes. **Do not enter them!** Pages 63 and 64 explain these codes and provide other essential information on entering *Ahoy!* programs. Refer to these pages **before** entering any programs!

```
8040: 4C 3A 80 E8 8E 01 08 A9 71
8048: 08 8D 02 08 A2 07 A0 01 33
8050: 84 FD 86 FE 88 E6 FE B1 78
8058: FD 8D 37 80 F0 06 C8 D0 2C
8060: F6 4C 55 80 C8 B1 FD CD BF
8068: 37 80 F0 04 88 4C 5E 80 C8
8070: C8 B1 FD CD 37 80 F0 05 64
8078: 88 88 4C 5E 80 A5 FE 85 DE
8080: 2E C8 C8 84 2D A6 2D 20 E5
8088: CD BD 4C 5E A6 65
```

Salmon Run

FROM PAGE 27

```
•30 POKE56,48:POKE52,48:CLR                                  GJ
•35 IFPEEK(16375)=8THEN700                                   ND
•38 PRINT"[CLEAR][WHITE][7"[DOWN]"]REPARI
 NG MACHINE LANGUAGE[3"."][DOWN][DOWN]"                      FO
•40 POKE53265,27:POKE56334,PEEK(56334)AND
 254:POKE1,PEEK(1)AND251:FORI=.TO79                          AI
•42 POKE14720+I,PEEK(53632+I):NEXT:POKE1,
 PEEK(1)OR4:POKE56334,PEEK(56334)OR1                         OA
•44 FORI=53104TO53151:POKEI,1:NEXT                           DH
•45 I=.:Z=.                                                  KE
•46 READA:IFA<0THEN48                                        NE
•47 POKE49152+I,A:Z=Z+A:I=I+1:GOTO46                         CN
•48 IFZ<>160018THENPRINT"ERROR IN CODE DA
 TA":STOP                                                    FM
•49 I=.:Z=.                                                  KE
•50 READA:IFA<0THEN52                                        ND
•51 POKE53152+I,A:Z=Z+A:I=I+1:GOTO50                         AF
•52 IFZ<>4625THENPRINT"ERROR IN VARIABLE
 DATA":STOP                                                  IH
•53 I=.:Z=.                                                  KE
•54 READA:IFA<0THEN56                                        NH
•55 POKE14336+I,A:Z=Z+A:I=I+1:GOTO54                         HM
•56 IFZ<>55366THENPRINT"ERROR IN CHARACTE
 R DATA":STOP                                                NB
•57 I=.:Z=.                                                  KE
•58 READA:IFA<0THEN60                                        MO
•59 POKE15936+I,A:Z=Z+A:I=I+1:GOTO58                         BB
•60 IFZ<>25190THENPRINT"ERROR IN SPRITE D
 ATA":STOP                                                   DK
•62 GOTO700                                                  CD
•100 REM*****SET-UP PLAYFIELD*****                           JH
•105 POKE53265,11                                            EC
•110 PRINT"[CLEAR]":POKE53280,5:POKE53281
 ,3:POKE53269,.:POKE53270,PEEK(53270)OR16                    MC
•120 POKE53272,30:POKE53275,.:POKE53276,3
 :POKE53282,1:POKE53283,.:POKE53285,1                        IO
•130 POKE53286,.:POKE53287,6:POKE53288,11                    KB
•140 FORI=56136TO56295:POKEI,14:NEXT:FORI
 =55656TO55659:POKEI,14:POKEI+40,14:NEXT                     LA
•150 FORI=55692TO55695:POKEI,8:POKEI+40,8
 :NEXT                                                       IH
•160 POKE1234,36:POKE1235,37:POKE1274,38:
 POKE1275,39:POKE55506,1:POKE55507,1                         ID
•170 POKE55546,1:POKE55547,1:POKE1211,36:
 POKE1212,37:POKE1251,38:POKE1252,39                         AL
•180 POKE55483,1:POKE55484,1:POKE55523,1:
 POKE55524,1                                                 KL
•190 FORI=1384TO1387:POKEI,I-1363:NEXT:FO
 RI=1424TO1426:POKEI,I-1399:NEXT                             LA
•200 FORI=1420TO1423:POKEI,I-1392:NEXT:FO
 RI=1461TO1463:POKEI,I-1428:NEXT                             FN
•210 FORI=1864TO1882:POKEI,40:POKEI+40,40
 :POKEI+80,40:NEXT                                           GE
•220 FORI=1984TO2023:POKEI,40:NEXT                           GM
•230 POKE52992,140:POKE52993,140:POKE5299
 4,96:POKE52995,240:POKE52996,.                              JE
•240 POKE52997,.:Z=PEEK(53278):FORI=53072
 TO53103:POKEI,.:NEXT:POKE53036,.                            OC
•250 POKE53269,3:POKE53037,.                                 GE
•260 POKE53211,255:POKE53212,255:POKE5321
 3,12:POKE54296,79:POKE54294,55                              FG
•270 POKE54295,129:POKE54277,128:POKE5427
 8,240:POKE54276,129:POKE54273,255                           IH
•280 POKE54284,128:POKE54285,240:POKE5428
 3,17:POKE1025,48:POKE1026,48:POKE1061,48                    BJ
•290 POKE1062,48:POKE55297,6:POKE55298,6:
 POKE55333,.:POKE55334,.:POKE53044,.                         GN
•300 POKE53045,.:POKE53265,27                                DP
•500 SYS50237                                                JL
•510 PRINT"[CLEAR][WHITE]":POKE53272,21:F
 ORI=54272TO54296:POKEI,.:NEXT:POKE53281,
 6                                                           EN
•515 L=PEEK(53044):R=PEEK(53045):POKE5326
 9,.                                                         LB
•520 IFL>HSTHENHS=L                                          HD
•522 IFR>HSTHENHS=R                                          HH
•525 IFL>RTHENPRINTTAB(08)"[9"[DOWN]"]THE
 LEFT (BLUE) PLAYER WON!":GOTO535                            IC
•527 IFL<RTHENPRINTTAB(08)"[9"[DOWN]"]THE
 RIGHT (BLACK) PLAYER WON!":GOTO535                          KP
•530 PRINTTAB(16)"[10"[DOWN]"]IT'S A TIE!
 "                                                           CN
•535 PRINTTAB(15)"[5"[DOWN]"]LEFT SCORE="
 L:PRINTTAB(14)"RIGHT SCORE="R                               JG
•540 FORI=1TO5000:NEXT                                       NB
•700 POKE53280,5:POKE53281,3:PRINT"[CLEAR
 ]":PRINTTAB(15)"[BLACK][10"[DOWN]"]SALMO
 N RUN"                                                      IN
•705 PRINTTAB(19)"[DOWN][DOWN]BY":PRINTTA
 B(15)"[DOWN]MIKE WACKER":PRINT"[HOME]HIG
 H SCORE= "HS                                                NG
•707 PRINTTAB(12)"[17"[DOWN]"]PRESS F1 TO
 PLAY"                                                       KN
•710 POKE53248,174:POKE53249,210:POKE5326
 4,.:POKE53269,1:POKE53287,6:X(3)=253                        II
•712 POKE53276,1:POKE53285,1:POKE53286,.:
 A=10:B=.:X(.)=254:X(1)=253:X(2)=252                         EF
•714 GETZ$:IF Z$="" THEN 714                                 JF
```

```
·716 IF Z$="[F1]" THEN 100                          MJ
·718 A=10:B=B+1:IFB=4THENB=.                        IE
·720 POKE2040,X(B):GOTO714                          PK
·999 REM****CODE DATA****                           BA
·1000 DATA133,169,134,140,132,141,166,169
,202,16,2,166,169,198,139,208,247,173               OF
·1002 DATA18,208,133,139,138,72,166,140,1
64,141,104,96,254,14,207,208,3,254,17               EB
·1004 DATA207,189,17,207,240,21,189,14,20
7,201,88,208,14,169,.,157,84,207,173                IK
·1006 DATA21,208,61,172,207,141,21,208,96
,173,4,207,141,46,207,173,.,208,141,47              AF
·1008 DATA207,173,1,208,141,48,207,208,18
,173,5,207,141,46,207,173,2,208,141,47              EE
·1010 DATA207,173,3,208,141,48,207,173,46
,207,221,17,207,208,17,173,47,207,56,253            IM
·1012 DATA14,207,176,2,73,255,201,24,176,
36,144,31,173,46,207,208,11,173,47,207              PH
·1014 DATA56,253,14,207,144,20,176,9,189,
14,207,56,237,47,207,144,9,73,255,201               IE
·1016 DATA24,176,3,169,1,96,169,.,96,206,
49,207,208,59,206,128,207,208,54,169                ON
·1018 DATA4,141,128,207,206,129,207,173,1
29,207,106,162,2,176,17,189,187,207,32              PC
·1020 DATA45,196,189,190,207,157,131,7,18
9,193,207,208,15,189,196,207,32,54,196              AD
·1022 DATA189,199,207,157,131,7,189,202,2
07,157,171,7,202,16,216,206,130,207,240             OM
·1024 DATA1,96,169,160,32,182,196,173,87,
207,240,16,169,.,141,87,207,141,51,207              ID
·1026 DATA169,7,141,50,207,141,89,207,173
,89,207,240,35,206,50,207,16,7,169,.,141            PC
·1028 DATA89,207,240,16,174,50,207,173,51
,207,208,5,189,205,207,208,3,189,212,207            PN
·1030 DATA141,7,212,141,8,212,96,173,88,2
07,240,250,169,.,141,88,207,169,1,208               MG
·1032 DATA191,162,1,222,112,207,240,3,76,
36,194,189,80,207,208,11,189,82,207,208             EF
·1034 DATA3,169,48,44,169,88,44,169,18,15
7,112,207,189,80,207,240,20,189,.,207               NB
·1036 DATA201,197,208,7,169,.,157,80,207,
240,6,254,.,207,76,246,193,188,.,220                LM
·1038 DATA152,41,1,208,10,189,.,207,201,6
9,240,3,222,.,207,152,41,2,208,10,189               OF
·1040 DATA.,207,201,197,240,3,254,.,207,1
52,41,4,208,25,189,4,207,208,7,189,2,207            JP
·1042 DATA201,24,240,13,222,2,207,189,2,2
07,201,255,208,3,222,4,207,152,41,8,208             IJ
·1044 DATA20,189,4,207,240,7,189,2,207,20
1,64,240,8,254,2,207,208,3,254,4,207,152            LJ
·1046 DATA41,16,208,10,189,.,207,201,102,
176,3,157,80,207,222,114,207,208,15,169             FK
·1048 DATA8,157,114,207,222,116,207,16,5,
169,3,157,116,207,188,116,207,189,80,207            CN
·1050 DATA240,4,169,255,208,3,185,160,207
,157,248,7,138,10,168,189,2,207,153,.               FA
·1052 DATA208,189,.,207,153,1,208,172,16,
208,189,4,207,240,6,152,29,164,207,208              EN
·1054 DATA4,152,61,166,207,141,16,208,202
,48,3,76,61,193,96,162,2,189,84,207,208             CP
·1056 DATA56,206,7,207,240,3,76,31,196,20
6,118,207,208,248,169,13,141,118,207,157            JO
·1058 DATA84,207,169,.,157,8,207,157,11,2
07,157,14,207,157,17,207,169,218,157,20             CI
·1060 DATA207,169,5,32,.,192,157,23,207,1
69,1,32,.,192,157,26,207,222,119,207                FE
·1062 DATA208,200,234,234,234,234,234,234
,189,11,207,240,75,169,64,157,119,207               KD
·1064 DATA189,29,207,240,13,222,32,207,20
8,54,169,.,157,29,207,157,35,207,189,35             EE
·1066 DATA207,240,18,222,20,207,222,38,20
7,208,33,169,5,157,29,207,157,32,207,208            MI
·1068 DATA23,32,38,196,32,164,196,208,11,
192,218,208,11,169,.,157,11,207,240,4               BN
·1070 DATA192,235,240,245,32,30,192,76,85
,195,189,8,207,240,89,169,32,157,119,207            AC
·1072 DATA189,41,207,10,168,185,.,208,157
,14,207,185,1,208,24,105,13,157,20,207              GP
·1074 DATA188,41,207,185,4,207,157,17,207
,189,14,207,217,168,207,208,44,189,17               OD
·1076 DATA207,217,170,207,208,36,189,20,2
07,201,109,176,29,141,87,207,169,.,153              AM
·1078 DATA82,207,157,84,207,173,21,208,61
,172,207,141,21,208,189,26,207,24,105               CK
·1080 DATA1,153,44,207,76,85,195,169,64,1
57,119,207,189,14,207,201,160,208,21,234            CF
·1082 DATA234,234,169,.,157,29,207,169,40
,157,38,207,157,11,207,157,35,207,208               JJ
·1084 DATA14,173,18,208,201,37,176,7,169,
7,32,.,192,240,224,32,30,192,189,84,207             JI
·1086 DATA208,3,76,31,196,173,6,207,61,17
5,207,240,69,173,6,207,41,1,240,41,173              OH
·1088 DATA80,207,240,36,32,65,192,240,31,
169,.,157,41,207,168,189,23,207,208,5               KE
·1090 DATA169,1,153,82,207,169,.,157,11,2
07,169,1,157,8,207,141,88,207,208,21,173            GD
·1092 DATA6,207,41,2,240,14,173,81,207,24
0,9,32,85,192,240,4,169,1,208,206,222               GL
·1094 DATA122,207,208,13,169,10,157,122,2
07,189,125,207,73,1,157,125,207,188,125             DF
·1096 DATA207,189,11,207,208,5,189,8,207,
240,5,185,178,207,208,13,189,26,207,208             EN
·1098 DATA5,185,180,207,208,3,185,182,207
,157,250,7,173,21,208,29,175,207,141,21             BP
·1100 DATA208,189,23,207,208,3,169,.,44,1
69,1,157,41,208,169,208,133,252,189,184             EL
·1102 DATA207,133,251,189,14,207,160,.,14
5,251,200,189,20,207,145,251,172,16,208             DL
·1104 DATA189,17,207,240,6,152,29,175,207
,208,4,152,61,172,207,141,16,208,202,48             HB
·1106 DATA3,76,45,194,96,254,20,207,188,2
0,207,96,157,91,7,169,19,141,174,7,96               MC
·1108 DATA157,91,7,169,20,208,245,32,165,
192,32,43,194,32,59,193,172,44,207,240              GA
·1110 DATA34,169,.,141,44,207,152,24,109,
52,207,141,52,207,238,2,4,173,2,4,201,58            OA
```

IMPORTANT! Letters on white background are **Bug Repellent** line codes. **Do not enter them!** Pages 63 and 64 explain these codes and provide other essential information on entering ***Ahoy!*** programs. Refer to these pages **before** entering any programs!

```
·1112 DATA208,8,169,48,141,2,4,238,1,4,13
 6,208,235,172,45,207,240,34,169,.,141,45 JG
·1114 DATA207,152,24,109,53,207,141,53,20
 7,238,38,4,173,38,4,201,58,208,8,169,48  AD
·1116 DATA141,38,4,238,37,4,136,208,235,2
 06,219,207,208,164,206,220,207,208,159   DN
·1118 DATA206,221,207,208,154,96,189,17,2
 07,208,12,189,14,207,201,160,176,3,169   EF
·1120 DATA.,44,169,1,96,141,130,207,173,3
 0,208,141,6,207,96,-1                    MO
·1122 REM****VARIABLES****                LG
·1124 DATA252,253,254,253,1,2,254,253,24,
 64,.,1,251,247,239,4,8,16,250,251,250    NG
·1126 DATA250,249,249,4,6,8,1,2,3,4,5,6,7
 ,8,9,10,11,12,13,14,15,16,17,18,32,30    GO
·1128 DATA27,23,18,12,5,6,13,19,24,28,31,
 33,112,142,6,-1                          OK
·1130 REM****PROGRAMABLE CHARACTERS****   JH
·1132 DATA.,.,.,.,.,.,.,.,255,223,247,247
 ,247,255,127,255,192,252,255,223,245,255 IB
·1134 DATA255,255,.,.,.,.,.,.,64,192,192,24
 7,253,255,253,245,247,247,253,255,247    PK
·1136 DATA253,253,255,127,255,127,192,240
 ,240,192,64,65,116,240,223,255,127,255   DJ
·1138 DATA223,247,253,253,255,223,213,127
 ,223,223,215,247,240,240,252,252,223,247 IC
·1140 DATA247,255,255,95,247,253,255,223,
 247,253,192,252,255,255,255,255,255,255  FF
·1142 DATA.,.,.,.,64,208,192,192,247,247,
 253,255,255,255,253,253,223,223,127,223  AF
·1144 DATA247,255,255,255,80,244,241,192,
 192,192,240,240,255,127,127,221,221,223  CB
·1146 DATA223,223,127,223,255,255,255,127
 ,223,255,240,241,84,124,221,255,247,255  LA
·1148 DATA20,64,64,68,17,64,1,20,16,64,1,
 84,.,80,5,64,63,253,250,255,255,253,63   LE
·1150 DATA15,239,255,119,239,111,239,255,
 255,255,223,175,235,250,95,255,255,112   DK
·1152 DATA212,252,252,252,252,240,192,.,.,.
 .,.,3,15,63,255,255,15,63,255,255,255,240 KA
·1154 DATA192,.,.,.,192,192,192,.,.,.,.,.,63,
 253,250,255,255,253,63,15,247,255,238    JE
·1156 DATA247,246,247,255,255,255,251,245
 ,215,95,250,255,255,112,212,252,252,252  GK
·1158 DATA252,240,192,.,.,.,.,.,.,.,.,.,.,.,3
 ,3,3,.,.,.,.,.,240,252,255,255,255,15,3,. LC
·1160 DATA.,.,.,.,192,240,252,255,255,252,2
 54,255,126,31,30,28,127,.,.,.,192,240    CF
·1162 DATA248,252,252,252,255,253,127,31,
 3,3,.,.,.,190,254,252,248,224,.,.,.,.,.,255 IO
·1164 DATA255,255,255,255,255,255,255,-1  KO
·1166 REM****SPRITE DATA****              LF
·1168 DATA.,.,.,.,.,.,.,.,.,.,.,.,.,.,.,.,.,.,.,.,.,.,.,.,.,.,.,.,.,.,.,.,.,.,.,.,.,
 .,.,.,.,.,.,.,.,.,.,16,127,224,25,255,248,27,255 NN
·1170 DATA24,31,255,24,31,255,248,27,255,
 248,25,255,248,16,127,224,.,.,.,.,.,.,.,.,.,.,. MH
·1172 DATA.,.,.,.,.,.,.,.,.,.,.,.,.,.,.,.,.,.,.,.,.,.,.,.,.,.,.,.,.,.,.,.,.,.,.,.,.,
 .,.,.,.,.,.,.,.,.,.,.,.,.,.,.,.,.,.,.,.,.,.,.,.,.,.,.,.,.,.,.,.,.,.,.,.,.,.,. DO
·1174 DATA4,127,128,6,254,96,7,254,96,7,2
 55,224,6,255,224,4,127,128,.,.,.,.,.,.,.,.,. MD
·1176 DATA.,.,.,.,.,.,.,.,.,.,.,.,.,.,.,.,.,.,.,.,.,.,.,.,.,.,.,.,.,.,.,.,.,.,.,.,.,
 .,.,.,.,.,.,.,.,.,.,.,.,.,.,.,.,.,.,.,.,.,.,.,.,.,.,.,.,.,.,.,.,.,.,.,.,.,.,. DO
·1178 DATA.,.,.,.,.,8,124,.,12,255,128,7,25
 4,96,7,254,96,6,255,224,2,127,224,.,3,12
 8                                        GK
·1180 DATA.,.,.,.,.,.,.,.,.,.,.,.,.,.,.,.,.,.,.,.,.,.,.,.,.,.,.,.,.,.,.,.,.,.,.,.,.,
 .,.,.,.,.,.,.,.,.,.,.,.,.,.,.,.,.,.,.,.,.,.,.,.,.,.,.,.,.,.,.,40,.,.,. OO
·1182 DATA166,.,130,42,2,160,10,10,160,8,
 10,170,40,170,170,170,170,170,170,170    BF
·1184 DATA170,170,170,42,170,168,42,187,1
 68,40,179,40,.,51,.,.,.,51,.,.,.,192,192,. MK
·1186 DATA192,192,3,51,48,.,.,.,.,.,.,.,.,.,.,.,.,
 .,.,.,.,.,.,.,.,.,.,.,40,.,.,.,166,.,2,42,.,.,.,10,. EP
·1188 DATA.,8,.,10,40,160,42,170,168,42,1
 70,168,170,170,170,170,170,170,170,187   AD
·1190 DATA170,40,179,40,40,51,40,.,51,.,.,.
 ,192,192,.,192,192,3,51,48,.,.,.,.,.,.,.,. HG
·1192 DATA.,.,.,.,.,.,.,.,.,.,.,.,.,40,.,.,.,166,.,
 2,42,.,.,.,10,.,.,.,8,.,10,40,160,42,170 PK
·1194 DATA168,42,170,168,42,170,168,42,17
 0,168,170,187,170,168,179,42,168,51,42   PO
·1196 DATA160,51,10,128,192,194,.,192,192
 ,3,51,48,.,128,192,194,128,51,2,128,51   BC
·1198 DATA2,160,51,10,168,51,42,168,179,4
 2,170,187,170,42,170,168,42,170,168,42   HE
·1200 DATA170,168,42,170,168,10,40,160,.,
 8,.,.,.,10,.                             CM
·1202 DATA.,42,.,.,.,38,.,.,.,42,.,.,.,8,.,.,.,8,
 .,.,.,.,.,.,.,.,.,.,.,.,.,.,-1           KO
```

Automatic Line Numbers

FROM PAGE 27

```
·10 FORI=49152TO49537:READA:POKEI,A:NEXT  OB
·20 SYS49152:NEW                          HM
·49152 DATA 173,36,3,201,188,240,19,141,1
 89,192                                   GN
·49162 DATA 173,37,3,141,190,192,169,188,
 141,36                                   JM
·49172 DATA 3,169,192,141,37,3,173,20,3,2
 01                                       JN
·49182 DATA 55,240,21,141,102,192,173,21,
 3,141                                    NL
·49192 DATA 103,192,120,169,55,141,20,3,1
 69,192                                   PA
·49202 DATA 141,21,3,88,96,165,197,201,64
 ,240                                     FA
·49212 DATA 40,205,127,193,240,35,141,127
 ,193,201                                 BN
·49222 DATA 4,208,8,173,124,193,73,255,14
 1,124                                    EO
·49232 DATA 193,201,5,208,8,173,125,193,7
```

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```
3,255                                                    DH
•49242 DATA 141,125,193,201,6,240,31,201,
3,240                                                    EK
•49252 DATA 3,76,49,234,169,70,32,153,192
,141                                                     GE
•49262 DATA 122,193,141,128,193,165,21,14
1,123,193                                                MI
•49272 DATA 141,129,193,162,255,108,0,3,1
69,91                                                    AE
•49282 DATA 32,153,192,141,126,193,173,12
8,193,141                                                KB
•49292 DATA 122,193,173,129,193,141,129,1
93,162,255                                               JA
•49302 DATA 108,0,3,160,193,32,30,171,32,
96                                                       HD
•49312 DATA 165,134,122,132,123,32,115,0,
170,240                                                  DO
•49322 DATA 243,162,255,134,58,144,1,96,3
2,107                                                    IL
•49332 DATA 169,169,0,133,198,165,20,96,3
2,87                                                     HL
•49342 DATA 241,8,133,251,201,13,240,4,16
5,251                                                    EF
•49352 DATA 40,96,173,124,193,240,247,169
,13,32                                                   EG
•49362 DATA 210,255,165,214,141,130,193,2
06,130,193                                               IO
•49372 DATA 134,252,132,253,173,123,193,1
74,122,193                                               IJ
•49382 DATA 133,98,134,99,142,128,193,141
,129,193                                                 PN
•49392 DATA 162,144,56,32,73,188,32,223,1
89,162                                                   NA
•49402 DATA 0,189,0,1,240,7,157,119,2,232 NE
•49412 DATA 76,251,192,169,32,157,119,2,2
32,173                                                   HI
•49422 DATA 125,193,208,29,134,198,173,12
2,193,24                                                 EO
•49432 DATA 109,126,193,141,122,193,144,3
,238,123                                                 MM
•49442 DATA 193,166,252,164,253,173,130,1
93,133,214                                               JK
•49452 DATA 76,198,192,160,0,185,65,193,2
40,8                                                     LB
•49462 DATA 200,157,119,2,232,76,49,193,7
6,18                                                     DN
•49472 DATA 193,68,65,84,65,0,13,69,78,84 DK
•49482 DATA 69,82,32,76,73,78,69,32,78,85 DB
•49492 DATA 77,66,69,82,58,32,0,13,69,78  AA
•49502 DATA 84,69,82,32,76,73,78,69,32,73 PF
•49512 DATA 78,67,82,69,77,69,78,84,40,48 KG
•49522 DATA 45,50,53,53,41,58,32,0,0,0    CN
•49532 DATA 0,0,10,64,0,0
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In the April Ahoy!, *Orson Scott Card shows VIC and 64 game programmers some tricks about sticks—joysticks.*

HOME BUDGET

FROM PAGE 43

```
•10 REM**********************                           CF
•20 REM*                    *                           OO
•30 REM*    HOME BUDGET     *                           ON
•40 REM*        BY          *                           IA
•50 REM*    BRIAN DOBBS     *                           NL
•60 REM*                    *                           OO
•70 REM*  TIMMINS,ONTARIO   *                           GI
•80 REM*                    *                           OO
•90 REM**********************                           CF
•100 POKE53280,12:POKE53281,0:DIMA$(13,13
):GOTO180                                               DM
•110 GOSUB1230                                          FN
•120 OPEN14,8,14,"0:"+NM$+",S,":X=1                     IP
•130 Y=2                                                DI
•140 INPUT#14, A$(X,Y):Y=Y+1:IFY>13THEN16
0                                                       DL
•150 GOTO140                                            CJ
•160 X=X+1:IFX>13THENCLOSE14:GOTO180                    HE
•170 GOTO130                                            CA
•180 PRINT"[CLEAR][DOWN][DOWN]"TAB(14)"BU
DGET MENU[DOWN][DOWN]"                                  FM
•190 PRINTTAB(10)"1-[RVSON]W[RVSOFF]RITE
MONTHLY BILLS":PRINT""                                  CE
•200 PRINTTAB(10)"2-[RVSON]V[RVSOFF]IEW M
ONTHLY BILLS":PRINT""                                   FL
•210 PRINTTAB(10)"3-[RVSON]B[RVSOFF]ARCHA
RT TREND OF BILLS":PRINT""                              GE
•220 PRINTTAB(10)"4-[RVSON]P[RVSOFF]RINTE
R TREND OF BILLS":PRINT""                               HC
•230 PRINTTAB(10)"5-[RVSON]S[RVSOFF]AVE D
ATA TO DISK":PRINT""                                    MH
•240 PRINTTAB(10)"6-[RVSON]L[RVSOFF]OAD D
ATA FROM DISK":PRINT""                                  FJ
•250 PRINTTAB(10)"7-[RVSON]CREATE INITIAL
 FILE":PRINT"[DOWN][DOWN]"                              CH
•260 PRINTTAB(12)"SELECT CHOICE ?":Y=0                  JJ
•270 GETAN$:IFAN$=""THEN270                             EL
•280 FORX=1TO7:IFAN$=MID$("WVBPSLC",X,1)T
HENY=X                                                  HB
•290 NEXT:ONYGOTO410,300,500,730,960,110,
990:GOTO180                                             IL
•300 PRINT"[CLEAR][4"[DOWN]"]":INPUT"  EN
TER MONTH TO VIEW";AN$:GOSUB1020                        PP
•310 PRINT"[CLEAR]":PRINTTAB(15)AN$:PRINT
"[DOWN][DOWN]":Y=2                                      MJ
•320 PRINTA$(1,Y):Y=Y+1:IFY>13THEN340                   KA
•330 GOTO320                                            CF
•340 PRINT"[13"[UP]"]":Y=2                              MI
•350 PRINTTAB(15)A$(X,Y):Y=Y+1:IFY>13THEN
370                                                     BC
•360 GOTO350                                            CA
•370 GOSUB1300                                          FB
•380 PRINT"[DOWN][DOW TOTAL"TAB(
```

```
 14)Q+AA+BB                                     ON
•390 GETA$:IFA$=""THEN390                       HD
•400 GOTO180                                    CN
•410 PRINT"[CLEAR][5"[DOWN]"]":INPUT"  WH
 AT MONTH TO WRITE BILLS";AN$                   EI
•420 GOSUB1020                                  FM
•430 Y=2:PRINT"[CLEAR]":PRINTTAB(15)AN$:P
 RINT"[DOWN][DOWN]"                             IJ
•440 PRINTA$(1,Y):Y=Y+1:IFY>13THEN460           KP
•450 GOTO440                                    CE
•460 PRINT"[13"[UP]"]":Y=2                      MI
•470 PRINTTAB(15):INPUTA$(X,Y)                  CF
•480 Y=Y+1:IFY>13THEN180                        KF
•490 GOTO470                                    CL
•500 INPUT"[CLEAR][4"[DOWN]"]  ENTER NAME
  OF BILL";AN$                                  PL
•510 FORP=2TO13                                 LA
•520 IFAN$=A$(1,P)THENY=P                       HC
•530 NEXT                                       IA
•540 PRINT"[DOWN][DOWN]  WHAT IS MAXIMUM
 SCALE FOR "A$(1,Y):INPUT"[DOWN][DOWN]  "
 ;B                                             LJ
•550 PRINT"[CLEAR]":PRINTTAB(20-(LEN(A$(1
 ,Y))/2))A$(1,Y)                                BD
•560 PRINT"[DOWN][DOWN]"B:Z=0                   KF
•570 Z=Z+(B/20):IFZ=BTHEN590                    AP
•580 PRINTINT(B-Z):GOTO570                      HM
•590 R=1992:X=2:T=56264:U=2                     NF
•600 FORE=RTOR-(40*((VAL(A$(X,Y))/(B/20))
 ))STEP-40:POKEE,224:NEXT                       NC
•610 FORF=TTOT-(40*((VAL(A$(X,Y))/(B/20))
 ))STEP-40:POKEF,U:NEXT                         DM
•620 R=R+2:X=X+1:T=T+2:U=U+1                    FL
•630 IFU=3THENU=1                               LJ
•640 IFX=14THEN660                              DH
•650 GOTO600                                    CC
•660 R=1992:T=56264:POKER,138:POKET,1:POK
 ER+2,134:POKET+2,1:POKER+4,141                 AI
•670 POKET+4,1:POKER+6,129:POKET+6,1:POKE
 R+8,141:POKET+8,1:POKER+10,138                 EB
•680 POKET+10,1:POKER+12,138:POKET+12,1:P
 OKER+14,129:POKET+14,1:POKER+16,147            ID
•690 POKET+16,1:POKER+18,143:POKET+18,1:P
 OKER+20,142:POKET+20,1:POKER+22,132            CJ
•700 POKET+22,1                                 FH
•710 GETA$:IFA$=""THEN710                       JP
•720 GOTO180                                    CN
•730 OPEN4,4:PRINT#4,TAB(38)"BUDGET 1984"
 :PRINT#4:L=2:M=7                               HP
•740 PRINT#4," BILL[15" "]";                    IG
•750 PRINT#4,"JANUARY[3" "]FEBUARY[3" "]M
 ARCH[5" "]APRIL[5" "]MAY[7" "]JUNE"            PG
•760 GOSUB850                                   DF
•770 L=2:M=7                                    KB
•780 GOSUB890                                   DJ
•790 L=8:M=13:PRINT#4," BILL[15" "]";           EK
•800 PRINT#4,"JULY[6" "]AUGUST[4" "]SEPTE
 MBER OCTOBER[3" "]NOVEMBER  DECEMBER"          BA
•810 GOSUB850                                   DF
•820 L=8:M=13                                   NM
•830 GOSUB890                                   DJ
•840 CLOSE4:RESTORE:GOTO180                     PI
•850 FORY=1TO13:Z=20-LEN(A$(1,Y))               GB
•860 PRINT#4,A$(1,Y)TAB(Z);                     AF
•870 FORI=LTOM:PRINT#4,(A$(I,Y))TAB(10-LE
 N(A$(I,Y)));:NEXTI:PRINT#4,CHR$(10)            GE
•880 NEXTY:PRINT#4:RETURN                       LO
•890 PRINT#4,"MONTHLY TOTAL"TAB(6)              CC
•900 FORX=LTOM                                  NC
•910 GOSUB1300                                  FB
•920 C=Q+AA+BB:C$=STR$(C)                       GJ
•930 PRINT#4,Q+AA+BBTAB(9-LEN(C$));:NEXTX       EA
•940 PRINT#4,CHR$(10)                           HC
•950 RETURN                                     IM
•960 GOSUB1230                                  FN
•970 OPEN14,8,14,"@0:"+NM$+",S,W"               JE
•980 X=1:GOTO1170                               MF
•990 PRINT"[CLEAR][DOWN]  A TOTAL OF 12 B
 ILLS WILL BE ENTERED.[3"[DOWN]"]":X=1:Y=
 2                                              HE
•1000 INPUT"NAME OF BILL";A$(X,Y):Y=Y+1:I
 FY>13THEN1070                                  JM
•1010 GOTO1000                                  FC
•1020 FORW=1TO12                                NF
•1030 READD$                                    PG
•1040 IFAN$=D$THENX=W+1                         CH
•1050 NEXT                                      IA
•1060 RESTORE:RETURN                            FD
•1070 PRINT"[CLEAR]":X=2                        PB
•1080 Y=2                                       DI
•1090 A$(X,Y)="0"                               NI
•1100 Y=Y+1:IFY>13THEN1120                      PO
•1110 GOTO1090                                  FJ
•1120 X=X+1:IFX>13THEN1140                      NJ
•1130 GOTO1080                                  FK
•1140 GOSUB1230                                 FN
•1150 OPEN14,8,14,"0:"+NM$+",S,W"               ID
•1160 X=1:PRINT"[DOWN][DOWN]  [RVSON]CREA
 TING INITIAL FILE[RVSOFF]"                     DO
•1170 Y=2                                       DI
•1180 PRINT#14,A$(X,Y):Y=Y+1:IFY>13THEN12
 00                                             AJ
•1190 GOTO1180                                  GD
•1200 X=X+1:IFX>13THEN1220                      NM
•1210 GOTO1170                                  FM
•1220 CLOSE14:GOTO180                           GE
•1230 INPUT"[CLEAR][DOWN][DOWN]  [RVSON]F
 ILENAME[RVSOFF]";NM$                           HO
•1240 PRINT"[DOWN][DOWN]  PRESS '[RVSON]F
 1[RVSOFF]' TO CONTINUE"                        JA
•1250 GETA$:IFA$=""THEN1250                     KE
•1260 IFA$=CHR$(133)THENRETURN                  JP
•1270 GOTO1260                                  FO
•1280 DATA JANUARY,FEBRUARY,MARCH,APRIL,M
 AY,JUNE,JULY,AUGUST,SEPTEMBER,OCTOBER          DO
•1290 DATA NOVEMBER,DECEMBER                    GE
```

IMPORTANT! Letters on white background are **Bug Repellent** line codes. **Do not enter them!** Pages 63 and 64 explain these codes and provide other essential information on entering ***Ahoy!*** programs. Refer to these pages **before** entering any programs!

```
•1300 Q=(VAL(A$(X,2)))+(VAL(A$(X,3)))+(VA
 L(A$(X,4)))+(VAL(A$(X,5)))                NF
•1310 AA=(VAL(A$(X,6)))+(VAL(A$(X,7)))+(V
 AL(A$(X,8)))+(VAL(A$(X,9)))               IM
•1320 BB=(VAL(A$(X,10)))+(VAL(A$(X,11)))+
 (VAL(A$(X,12)))+(VAL(A$(X,13)))           KK
•1330 RETURN                               IM
```

ELFRED

FROM PAGE 59

```
•10 V=53248:POKEV+32,2:POKEV+33,5:S=54272
 :FORLL=0TO24:POKES+LL,0:NEXT              GG
•15 PRINT"[CLEAR][c 2][8"[DOWN]"]"SPC(17)
 "ELFRED":GOSUB420                         CB
•20 FORN=0TO63:READQ:POKE704+N,Q:NEXT:FOR
 N=0TO191:READQ:POKE832+N,Q:NEXT           IH
•25 POKEV+23,1:POKEV+37,1:POKEV+38,2:POKE
 V+28,254:POKEV+21,255                     PE
•30 PRINT"[11"[DOWN]"][6" "]PLEASE WAIT[3"
 ."] READING DATA[3"."]":POKE2041,13       AO
•35 POKEV+40,10:POKEV+2,172:POKEV+3,90:FO
 RN=0TO511:READQ:POKE12288+N,Q:NEXT        CB
•40 POKE198,0:PRINT"[CLEAR][3"[DOWN]"]HOW
  MANY BAGS DO YOU WANT TO PACK? (1-5)"    CM
•45 GETA$:IFA$=""THEN45                    EK
•50 IFA$<"1"ORA$>"5"THEN45                 JD
•55 A=VAL(A$):PRINTA"[3"[DOWN]"]TYPE NAME
  AND HIT RETURN"                          GG
•60 FORL=1TOA:PRINT"BAG #"L:INPUTN$(L):N$
 (L)=LEFT$(N$(L),9):NEXT                   PO
•65 PRINT"[CLEAR]CHOOSE SPEED:  0 SLOW AN
 D EASY"SPC(71)"TO"SPC(72)"9 WATCH THEM Z
 IP!"                                      LA
•70 GETSP$:IFSP$=""THEN70                  DD
•75 IFSP$<"0"ORSP$>"9"THEN70               GD
•80 SP=VAL(SP$)+1:FORB=1TOA                NI
•85 POKE53280,1:POKE53281,3:PRINT"[CLEAR]
 ";                                        BH
•90 FORL=1TO4:PRINT"[RVSON][BLUE][4" "][W
 HITE]  [BLUE][4" "][WHITE]  [BLUE][4" "]
 [WHITE]  [BLUE][4" "][WHITE]  [BLUE][4"
 "][WHITE][12" "]";:NEXT                   NI
•95 FORL=1TO40:PRINT"[WHITE] ";:NEXT:POKE
 V+2,175:POKEV+3,140                       PI
•100 PRINT"[RVSOFF][RIGHT][RIGHT][GREEN][
 c B][c B][RIGHT][RIGHT][WHITE].[RIGHT][c
  2][RVSON] [RVSOFF][4"[RIGHT]"][GREEN][c
  B][c B] [BLACK][s U][11"[s *]"][s I]"    AC
•105 PRINT"  [GREEN][c B][c B][WHITE][RVS
 ON][c *][RVSOFF].[RIGHT][RVSON][sEP][c 2
 ] [WHITE][c *][RIGHT][RVSOFF].[RVSON][sE
 P][GREEN][RVSOFF][c B][c B] [BLACK][s -]
  HIT [RVSON]SPACE[RVSOFF] [s -]"          OO
•110 PRINT"  [GREEN][c B][c B][RVSON][c 2
 ][9" "][RVSOFF][GREEN][c B][c B] [BLACK]
 [s -] TO CHOOSE [s -]"                    NC
•115 PRINT"  [GREEN][c B][c B][RIGHT][WHI
 TE].[RIGHT].[c 2][RVSON] [WHITE][RVSOFF]
 .[3"[RIGHT]"][GREEN][c B][c B] [BLACK][s
  -][4" "]TOYS[3" "][s -]"                 JO
•120 PRINT"  [GREEN][c B][c B][WHITE].[3"
 [RIGHT]"][c 2][RVSON] [RIGHT][RVSOFF][WH
 ITE].[RIGHT].[GREEN][c B][c B] [BLACK][s
  -][11" "][s -]"                          PB
•125 PRINT"  [GREEN][c B][c B][WHITE][RVS
 ON][c *][RIGHT][RVSOFF].[RVSON][sEP][c 2
 ] [WHITE][c *][RIGHT][RIGHT][sEP][GREEN]
 [RVSOFF][c B][c B] [BLACK][s J][4"[s *]"
 ][s M][s N][5"[s *]"][s K]":PRINT"  [GRE
 EN][c B][c B][c 2][9"[c U]"][GREEN][c B]
 [c B][DOWN][DOWN]"                        NM
•130 FORJ=1TO160:PRINT"[RVSON][BLUE] ";:N
 EXT:PRINTTAB(35)"[13"[UP]"][c 1][RVSOFF]
 *"                                        EM
•135 PRINTTAB(34)"[GREEN][RVSON][sEP] [c
 *][DOWN][4"[LEFT]"][sEP][3" "][c *][DOWN
 ][5"[LEFT]"][sEP][3" "][c *][DOWN][6"[LE
 FT]"][sEP][3" "]* [c *][DOWN][7"[LEFT]"]
 [sEP][5" "][c *][LEFT]"                   NO
•140 FORJ=1TO2:PRINTSPC(31)"[RVSON][sEP][
 7" "][c *]";:NEXT                         BO
•145 POKE2040,11:POKEV+21,255:POKEV,248:P
 OKEV+1,153:POKEV+39,5                     GL
•150 FORJ=1TO2:PRINTSPC(31)"[RVSON][9" "]
 ";:NEXT                                   MI
•155 FORJ=1TO3:PRINTSPC(30)"[RVSON][10" "
 ]";:NEXT:POKE1537,170:POKE1620,170        PG
•160 PRINTSPC(28)"[RVSON][sEP][11" "]";:P
 OKE1736,170:POKE1741,170:POKE1663,170     CE
•165 PRINTSPC(27)"[RVSON][sEP] *[10" "]"S
 PC(29)"[sEP][8" "]* "SPC(32)"[sEP]*[4" "
 ][c *]"                                   CB
•170 PRINTSPC(34)"[c 2][RVSON][3" "]"SPC(
 36)"[RED][sEP][3" "][c *][5"[UP]"]"SPC(1
 5);                                       IB
•175 PRINT"[RVSOFF][RED][c *][RVSON][7" "
 ][RVSOFF][sEP]"SPC(32)"[RVSON][7" "]"SPC
 (32)"[sEP]  FOR  [c *]"SPC(31)"[9" "]";   MO
•180 PRINTSPC(31)"[9" "]"SPC(31)"[RVSOFF]
 [c *][RVSON][7" "][RVSOFF][sEP][UP][UP][
 RVSON]";                                  LO
•185 PRINTSPC(35-(INT(LEN(N$(B))/2)))N$(B
 )                                         MJ
•190 PRINT"[HOME]"SPC(29)"SPEED:"SP-1SPC(
 71)"TOTAL"SPC(35)"MISSES:"SC"[3"[LEFT]"]
 ";                                        OE
•195 Z=1:XX=25:X=4:Y=5:CC=41:POKEV+14,150
 :POKEV+15,166                             NE
•200 FORT=192TO200:IFT=200THENT=192        OG
•205 IFZ=6THEN230                          AK
```

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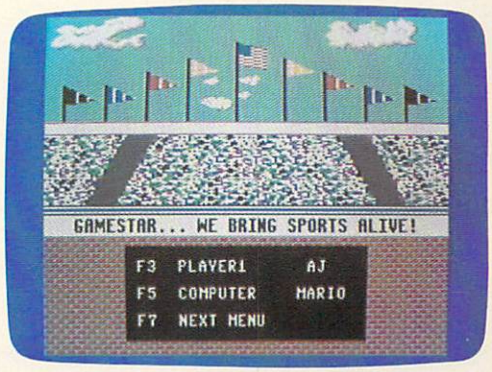
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```
·210 POKE2047,T:GOSUB380:POKEV+46,C:FORL=
1TO100:IFPEEK(197)<>60THEN225              JI
·215 G(Z)=T:POKE2041+Z,T:POKEV+X,XX:POKEV
+Y,55:POKEV+CC,C:GOSUB410                  BP
·220 Z=Z+1:X=X+2:XX=XX+49:Y=Y+2:CC=CC+1:F
ORL=1TO100                                 GH
·225 NEXTL:NEXTT                           NM
·230 POKEV+14,0:T=192+INT(RND(0)*8)        PJ
·235 PRINT"[HOME][5"[DOWN]"]"SPC(58)"HIT
[RVSON]SPACE[RVSOFF]"SPC(31)" TO DROP "S
PC(32)"TOY IN"SPC(36);                     LH
·240 PRINT"BAG"                            KL
·245 POKE2047,T:GOSUB380:POKEV+46,C:FORX=
0TO249STEPSP:POKEV+14,X:POKEV+15,166       PK
·250 IFPEEK(197)<>60THEN270                FK
·255 GOSUB315:IFG(1)=0ANDG(2)=0ANDG(3)=0A
NDG(4)=0ANDG(5)=0ANDB=ATHEN365             HG
·260 IFG(1)=0ANDG(2)=0ANDG(3)=0ANDG(4)=0A
NDG(5)=0ANDB<ATHENGOSUB420:NEXTB           ME
·265 GOTO230                               CF
·270 IFX>170THENPOKE2041,15:GOTO285        FI
·275 IFX>160THENPOKE2041,14:GOTO285        CI
·280 POKE2041,13                           PB
·285 NEXTX:FORZ=1TO5:IFG(Z)=TTHENFF=1:POK
EV+14,0:GOSUB330:FF=0:GOTO295              HO
·290 NEXTZ                                 NM
·295 POKEV+14,0:POKE2041,14:M=M+1:IFM=5TH
EN305                                      AH
·300 GOTO230                               CF
·305 FORZ=1TO5:IFG(Z)>0THENT=G(Z):M=0:GOT
O245                                       DN
·310 NEXTZ                                 NM
·315 IFX<138ORX>170THEN330                 OP
·320 FORZ=1TO5:IFG(Z)=TTHENPOKEV+27,128:G
OTO345                                     AH
·325 NEXTZ                                 NM
·330 SC=SC+1:PRINT"[HOME][3"[DOWN]"]"SPC(
36)SC"[HOME][4"[DOWN]"]"                   EB
·335 PRINTSPC(18)"[9" "]"SPC(32)" OOPS! "
SPC(33)"[6" "]"SPC(36)"[3" "]"             FP
·340 IFFF=1THEN355                         EI
·345 FORY=166TO250STEP3:POKEV+14,X:POKEV+
15,Y:NEXT:POKEV+27,0                       KK
·350 IFX>137ANDX<171ANDG(Z)=TTHENPOKEV+2*
(Z+1),0:GOSUB400:G(Z)=0:RETURN             CM
·355 FORJ=1TO2:FORL=13TO15:POKE2041,L:FOR
LL=1TO50:NEXTLL:NEXTL                      GB
·360 FORL=15TO13STEP-1:POKE2041,L:FORLL=1
TO50:NEXTLL:NEXTL:NEXTJ:RETURN             AC
·365 GOSUB420:PRINTSPC(57)"PLAY AGAIN?"SP
C(30)"HIT [RVSON]SPACE"                    JJ
·370 IFPEEK(197)=60THENPOKEV+3,0:POKEV,0:
SC=0:GOTO40                                PN
·375 GOTO370                               CG
·380 IFT=194ORT=196ORT=199THENC=0:RETURN   GH
·385 IFT=193THENC=1:RETURN                 ME
·390 IFT=198THENC=5:RETURN                 OB
·395 IFT=192ORT=195ORT=197THENC=7:RETURN   KH
·400 POKE2041,14:PRINT"[HOME][4"[DOWN]"]"
SPC(98)"[9" "]"SPC(32)"HOORAY!"SPC(33)"[
6" "]";                                    EF
·405 PRINTSPC(36)"[3" "][HOME][5"[DOWN]"]
"                                          NJ
·410 POKES+1,130:POKES+15,65               GC
·415 POKES+24,15:POKES+4,21:FORLL=1TO500:
NEXTLL:POKES+4,20:POKES+24,0:RETURN        JF
·420 RESTORE                               IO
·425 POKES+24,15:POKES+5,9:POKES+6,0:READ
D,H,L:IFD=-1THENPOKES+24,0:RETURN          JF
·430 POKES+1,H:POKES,L:POKES+4,17:FORSS=1
TOD*1.5:NEXT:POKES+4,16:GOTO425            NC
·435 DATA120,25,30,110,33,135,50,33,135,5
0,37,162,50,33,135,50,31,165,120,28,49     OB
·440 DATA120,28,49,120,28,49,120,37,162,5
0,37,162,50,42,62,50,37,162,50,33,135      JE
·445 DATA120,31,165,120,25,30,120,25,30,1
20,42,62,50,42,62,50,44,193,50,42,62       EH
·450 DATA50,37,162,120,33,135,120,28,49,5
0,25,30,50,25,30,120,28,49,120,37,162      NL
·455 DATA120,31,165,250,33,135,-1,-1,-1    PB
·460 DATA0,0,1,0,0,7,0,0,31,0,0,127,0,1,2
55,0,0,31,0,0,127,0,1,255,0,7,255          CC
·465 DATA0,15,255,0,31,255,0,127,255,1,25
5,255,0,31,255,0,127,255,1,255,255         MA
·470 DATA3,255,255,7,255,255,31,255,255,1
27,255,255,255,255,255,0                   HD
·475 DATA0,0,5,0,63,252,3,255,252,15,255,
252,63,255,252,21,85,84,21,85,84,42        GG
·480 DATA170,168,21,149,174,14,174,186,10
,170,170,42,170,170,170,170,174,170        MH
·485 DATA170,174,42,170,170,10,171,170,10
,174,160,15,250,176,10,170,255,254,171     GC
·490 DATA255,255,255,255,0                 CP
·495 DATA0,20,0,0,60,0,0,255,0,3,255,192,
15,255,240,21,85,84,21,85                  FM
·500 DATA84,42,170,168,37,105,88,107,170,
238,170,170,170,186,170                    HN
·505 DATA174,186,170,174,170,170,170,43,1
70,232,42,235,168,10,190,160               LL
·510 DATA2,170,128,63,170,252,255,255,255
,255,255,255,0                             DD
·515 DATA80,0,0,15,252,0,15,255,192,15,25
5,240,15,255,252,5,85,84,5,85              BD
·520 DATA84,10,170,168,174,86,84,171,186,
176,170,170,160,174,170,168                DG
·525 DATA174,170,170,170,170,170,170,170,
168,42,186,168,10,174,160,14               BN
·530 DATA175,192,255,234,168,255,250,173,
255,255,255,0                              CC
·535 DATA0,0,48,0,0,32,0,0,168,0,0,154,0,
0,170,0,0,160,0,0,160,0,0,160,0,0,160      HJ
·540 DATA0,0,160,0,0,160,2,70,160,11,234,
168,10,190,168,42,170,168,170,254,168      OI
·545 DATA10,170,160,8,195,32,8,195,32,8,1
95,32,8,195,32,0                           ED
·550 DATA0,0,0,0,0,160,0,2,8,0,8,70,0,8,2
```

```
,0,2,8,0,0,160,0,2,8,0,11,254,2,43,254    HM
•555 DATA0,171,234,2,163,168,0,2,172,8,11
,188,40,15,252,42,175,252,10,175,240,0    CP
•560 DATA15,240,40,42,0,10,168,0,2,128,0,
0                                         MO
•565 DATA0,0,0,0,0,0,0,0,0,2,170,128,10,1
85,160,46,85,184,42,85,168,165            JL
•570 DATA170,90,149,190,86,149,190,86,149
,190,86,149,190,86,165,170,90,42          KB
•575 DATA85,168,46,85,184,10,85,160,2,170
,128,0,0,0,0,0,0,0,0,0,0,0,0,0            FI
•580 DATA0,0,0,0,0,0,0,0,0,0,0,0,252,0,0,
32,0,0,8,0,0,2,240,0,10,191               JO
•585 DATA0,42,165,240,10,255,255,2,255,25
5,10,0,0,8,0,0,32,0,0,252                 PB
•590 DATA0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,
0,0                                       BC
•595 DATA0,128,0,0,144,0,0,132,0,0,133,0,
0,133,0,0,133,64,0,133,64,0,133           OP
•600 DATA80,0,133,80,0,133,84,0,133,84,0,
149,85,0,170,170,0,128,0,170,170,170      NC
•605 DATA191,255,254,47,255,248,47,255,24
8,11,255,224,2,170,128,0,0,0,0            AF
•610 DATA0,0,0,0,0,0,0,0,0,0,0,0,2,128,0,
10,160,0,59,160,0,250,160,0,10            EH
•615 DATA160,162,2,130,170,2,170,170,10,1
70,170,42,170,168,42,170,168,42           JP
•620 DATA170,160,10,170,160,2,170,128,0,0
,0,0,0,0,0,0,0,0,0,0,0                    NM
•625 DATA170,170,160,170,170,164,170,170,
166,170,170,166,170,170,166               ID
•630 DATA171,254,166,170,170,166,175,255,
166,170,170,166,170,170,166,170           EK
•635 DATA170,166,170,170,166,170,170,166,
170,170,166,170,170,166,170,170           BL
•640 DATA166,170,170,166,170,170,166,170,
170,166,37,85,86,10,170,170,0             FN
•645 DATA0,168,0,2,170,0,10,102,128,10,10
2,128,10,170,128,2,170,0,2,170            CP
•650 DATA0,10,170,128,34,8,32,130,8,8,130
,8,8,32,130,32,8,34,32,32,34              NH
•655 DATA32,128,130,8,130,0,130,0,0,0,0,0
,0,0,0,0,0,0,0,0,0,0,0                    IK
```

NUMEROLOGY

FROM PAGE 45

C-64 VERSION

```
•10 REM"[3"*"]NUMEROLOGY FOR C-64[3"*"]"  GO
•12 REM SET SCREEN COLORS AND LOCK IN CAS
E                                         NE
•14 POKE53280,1:POKE53281,1:POKE646,6:PRI
NTCHR$(142)CHR$(8):R$=CHR$(13)            AK
•18 PRINT"[CLEAR][DOWN][DOWN][7" "][s V][
s V]  [s V][s V]  [s V][s V]  [s V][s V]
  [s V][s V]  [s V][s V]  [s V][s V]"     JK
```

See next issue's Scuttlebutt *section for a rundown on all the new Commodore-compatible software and peripherals previewed at the January '85 Consumer Electronics Show!*

```
•20 PRINT"[7" "][s V][s V]  [s V][s V]  [
s V][s V]  [s V][s V]  [s V][s V]  [s V]
[s V]  [s V][s V]"                        KF
•22 PRINT"[4"[DOWN]"][14" "]NUMEROLOGY"   NF
•24 PRINT"[DOWN][DOWN][3" "]I WILL ANALYZ
E A NAME OR DATE FOR[4" "]ITS MYSTICAL V
IBRATIONS."                               BP
•26 PRINT"[DOWN][DOWN][3" "]ACCORDING TO
THE ANCIENTS, THESE","VIBRATIONS CONTRIB
UTED ";                                   OG
•28 PRINT"CHARACTERISTICS"                GB
•30 PRINT"[4"[DOWN]"][7" "][s V][s V]  [s
 V][s V]  [s V][s V]  [s V][s V]  [s V][
s V]  [s V][s V]  [s V][s V]"             DB
•32 PRINT"[7" "][s V][s V]  [s V][s V]  [
s V][s V]  [s V][s V]  [s V][s V]  [s V]
[s V]  [s V][s V]"                        KF
•36 FORJ=2TO7:POKE53280,J:FORI=55496TO560
95:POKEI,J:NEXTI,J                        EB
•38 POKE53280,1:POKE53281,1:POKE646,6:PRI
NTCHR$(142)CHR$(8):R$=CHR$(13)            AK
•40 REM SET ALL COUNTERS AND STRINGS TO Z
ERO                                       NC
•42 V=0:Z=0:N$="":A$=""                   DC
•46 PRINT"[CLEAR][4"[DOWN]"][BLUE]ANALYZE
 A NAME ([c 3]N[BLUE]) , OR A DATE ([c 3
]D[BLUE])?"                               EK
•48 PRINT"[DOWN](HIT [RED]Q[BLUE] TO QUIT
)"                                        DE
•50 GETQ$:IFQ$=""THEN50                   HO
•52 IFQ$="Q"THENPRINT"[CLEAR][DOWN][DOWN]
BYE NOW":END                              II
•54 IFQ$<>"N"ANDQ$<>"D"THEN46             PK
•56 IFQ$="N"THEN96                        EI
•58 REM BREAKING A DATE INTO ITS SINGLE N
UMBER                                     NO
•60 PRINT"[CLEAR][5"[DOWN]"]DATE TO BE AN
ALYZED --[RED] NUMBERS[BLUE] ONLY"        DF
•62 PRINT"(PROPER FORM WOULD BE 12 15 198
4)":INPUT N                               BL
•64 N$=STR$(N)                            IA
•66 FORI=2TOLEN(N$)                       MK
•68 A$=MID$(N$,I,1)                       IB
•70 IFASC(A$)=32ORVAL(A$)>0 ORVAL(A$)<10T
HEN74                                     NL
•72 PRINT"INVALID CHARACTER ENTERED - TRY
 AGAIN":GOTO60                            IJ
•74 IFASC(A$)=32THENNEXT                  FK
•76 Z=Z+(VAL(A$)):NEXT                    HA
•78 Z$=STR$(Z)                            KI
•80 V=0:IFLEN(Z$)<=2THEN132               JB
•82 FORI=1TOLEN(Z$)                       NN
```

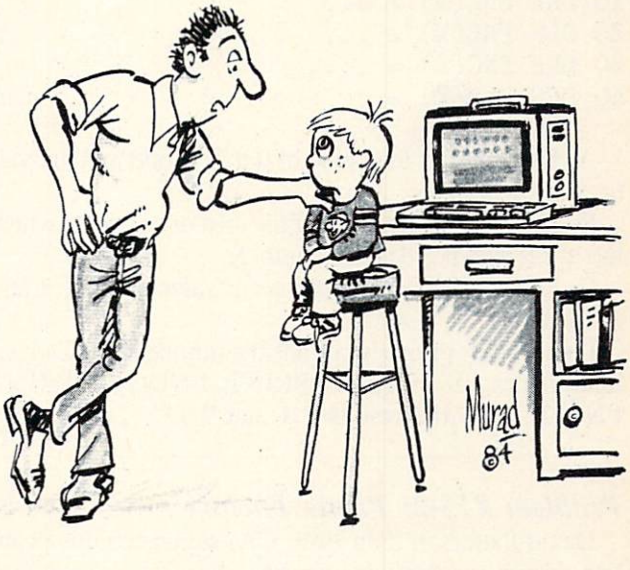
```
•84 V=VAL(MID$(Z$,I,1))+V                KO
•86 NEXT                                 IA
•88 IFV<10THENZ$=STR$(V):GOTO132         OO
•90 Z$=STR$(V)                           JE
•92 GOTO80                               PA
•94 REM BREAKING A NAME INTO ITS NUMBER  HE
•96 PRINT"[CLEAR][5"[DOWN]"]NAME TO BE AN
ALYZED --[RED] LETTERS[BLUE] ONLY"       DD
•98 PRINT"(PROPER FORM IS NAME COMMONLY U
SED -[4" "]FULL NAME OR NICKNAME)"       IL
•100 INPUT N$                            PO
•102 FORI=1TOLEN(N$)                     OB
•104 A$=MID$(N$,I,1)                     IB
•106 IFASC(A$)=32ORASC(A$)>65OR ASC(A$)<9
1THEN110                                 OF
•108 PRINT"INVALID CHARACTERS ENTERED - T
RY AGAIN"                                GM
•110 IFASC(A$)=32THENNEXT                FK
•112 Z=Z+(ASC(A$)-64):NEXT               JN
•114 Z$=STR$(Z)                          KI
•116 V=0: IFLEN(Z$)<=2THEN132            JB
•118 FORI=1TOLEN(Z$)                     NN
•120 V=VAL(MID$(Z$,I,1))+V               KO
•122 NEXT                                IA
•124 IFV<10THENZ$=STR$(V):GOTO132        OO
•126 Z$=STR$(V)                          JE
•128 GOTO116                             CI
•130 REM PRINTING OUT THE OUTCOME        KL
•132 N=LEN(N$):N=(40-N)/2                GD
•134 PRINT"[CLEAR][3"[DOWN]"]"TAB(N)N$R$S
PC(8)"VIBRATES TO THE NUMBER "Z$R$R$     HF
•136 Z=VAL(Z$):FORI=0TO(Z-1)*10:READB$:NE
XT                                       LK
•138 FORI=1TO10:READB$:PRINTB$;:NEXT     CJ
•140 PRINTR$R$R$SPC(9)"HIT ANY KEY TO CON
T."                                      OP
•142 GETA$:IFA$=""THEN142                HK
•144 RESTORE:GOTO38                      LO
•146 REM DATA STATEMENTS FOR THE OUTCOME EK
•148 DATA,"RULED BY THE SUN. DRIVING LIFE
 FORCE. A LEADER, AMBITIOUS, IMPATIENT"  DA
•150 DATA",AN EXPLOREREXTROVERT, AUTOMATI
CALLY ASSUMES COMMAND"                   OE
•152 DATA"VERY STRONG FEELINGS. ENTITLED
TO PRAISEWHICH CAN SPUR TO"              NA
•154 DATA" GREATER THINGS. DESIREFOR ACTI
ON & VIGOR TO DO.  TROUBLE",,,           HC
•156 DATA" WITH LONG RANGE PROJECTS. SHOU
LD CHOOSE ONE  THING AND STICK"          LL
•158 DATA" WITH IT.  COURAGE AND[3" "]SEL
F RELIANT."                              IL
•160 DATA"COMPATIBLE WITH OTHER FIRES- 1,
 3, OR 9"                                IM
•162 DATA"RULED BY THE MOON. SENSITIVE, D
OMESTIC, EMOTIONAL."                     MM
•164 DATA"EASILY MOVED TO TEARS. FERTILEI
MAGINATION.  FOND OF"                    AN
•166 DATA" HOME. PATRIOTIC.  PREFERS TO L
IVE NEAR WATER. MUSICAL[5" "]",,,,       JI
•168 DATA"TALENT. QUIET POWER OF JUDGEMEN
T.  GOOD PLANNER. CHANGEABLE"            OL
•170 DATA" DISPOSITION,[8" "]RESTLESS, EM
OTIONAL."                                FE
•172 DATA"  COMPATIBLE WITH[3" "]OTHER WA
TERS- 2, 7                               EF
•174 DATA"RULED BY JUPITER. INVESTIGATOR,
SCIENTISTSEEKER, MATERIAL RATHER"        KK
•176 DATA" THAN SPIRITUAL. GOOD SENSE OF
HUMOR. TRUSTING. LIKES TO KNOW WHY"      AI
•178 DATA" AND HOW.NOT INTERESTED IN MONE
Y",,,,                                   ND
•180 DATA"ABILITY PLUS CONFIDENCE.  IMPAT
IENCE.[3" "]TALENT & VERSITILE"          KI
•182 DATA". QUICK THINKING AND  INTUITIVE
."                                       HA
•184 DATA"COMPATIBLE WITH OTHER FIRE- 1,3
, OR 9"                                  FI
•186 DATA"RULED BY URANUS. APPEARS STRANG
E AND[4" "]ECCENTRIC. AHEAD OF HIS TIME.
"                                        LH
•188 DATA" INTEREST  IN OCCULT, PSYCHIC &
 OUT OF THE ORDINARY"                    KA
•190 DATA"INTUITIVE.SARCASTIC IF CROSSED.
 LIBERTY,EQUALITY." ,,,,                 EL
•192 DATA"SUCCESS IN SCIENCE & MECHANICAL
FIELDS. STEADY AND STABLE."              CB
•194 DATA" STRENGTH AND PRIDE. GOOD WITH
DETAILS, ACCURATE."                      IG
•196 DATA"[5" "]COMPATIBLE WITH OTHER AIR
S - 4 OR 5"                              LI
•198 DATA"RULED BY MERCURY. ACTIVE PHYSIC
ALLY AND MENTALLY. INQUIRING,"           EJ
•200 DATA" EXPLORING. LIKES[3" "]READING
AND RESEARCH. LINGUISTIC. GOOD  TEACHER,
"                                        NE
•202 DATA"WRITER, SECRETARY. FRIENDLY,[4"
 "]METHODICAL, ORDERLY.",,,,             CF
•204 DATA"INDEPENDENT THOUGHT AND ACTION.
 SPIRIT OF ADVENTURE."                   GL
•206 DATA"[8" "]SPECULATOR. LIKES THE DRA
MATIC."                                  JE
•208 DATA"[9" "]COMPATIBLE WITH OTHER AIR
S - 4 OR 5"                              LI
•210 DATA"RULED BY VENUS. GENTLE, REFINED
, COMELY,SOCIABLE, PLEASANT.  "          EJ
•212 DATA" A PEACEMAKER.[5" "]DIFFICULTIE
S IN FINANCES. FRIENDLY AND  AGREEABLE." HE
•214 DATA"  A GOOD HOST OR HOSTESS.  ",,,
,                                        IL
•216 DATA"[3" "]SUCCESS THROUGH COMPETENC
E, YOU SHOULD  FULFILL  WHAT YOU PROMISE
."                                       BJ
•218 DATA" INTEGRITY ANDTRUST.  POPULAR S
OCIALLY & POLITICALLY."                  AM
•220 DATA" COMPATIBLE WITH OTHER EARTHS -
 6 OR 8"                                 MA
```

```
•222 DATA"RULED BY NEPTUNE. PSYCHIC, INTR
 OVERT,[3" "]MYSTERIOUS. DOES NOT"        IP
•224 DATA" SAY MUCH,BUT KNOWS MUCH. DRAWN
  TO OCCULT. LIKES FISHING"               MM
•226 DATA".[3" "]TAKES FROM HAVES, GIVES
 TO HAVE-NOTS.",,,,                       DJ
•228 DATA"[3" "]SUCCESSIN ART, SCIENCE, P
 HILOSOPHY,[5" "]THROUGH PLANNING.TENDS"  NM
•230 DATA" TO BE INPRACTICALDREAMER, NEED
 S A POSITIVE GOAL."                      BH
•232 DATA"[9" "]COMPATIBLE WITH OTHER WAT
 ERS - 2 OR 7"                            EC
•234 DATA"RULED BY SATURN. COLD, PESSIMIS
 TIC. NO  SENSE OF HUMOR."                CN
•236 DATA" SUCCESS IN FINANCES.[4" "]ASSO
 CIATED WITH  MINING, REAL ESTATE,[3" "]L
 AW,"                                     MO
•238 DATA" CEMETERIES,PAWN SHOPS. HARD WO
 RKER.CONCERNED WITH THE PAST.",,,,       DO
•240 DATA" THRIVES ON[5" "]PROGRESS AND A
 CTIVITY. GUARD AGAINST[4" "]PETTY "      JM
•242 DATA"JEALOUSY.[3" "]THINK BIG AIM HI
 GH.[3" "]MATERIAL SUCCESS."              ML
•244 DATA"  COMPATIBLE WITH OTHEREARTHS -
  6 OR 8"                                 MA
•246 DATA"RULED BY MARS. EMOTIONAL, JEALO
 US. TIED TO FAMILY. ACTIVE."             EN
•248 DATA" LOYAL. SUSPICIOUS OF STRANGERS
 , IMPULSIVE. AFRAID OF UNKNOWN."         LP
•250 DATA"ASSOCIATED WITH SURGERY, PHYSIC
 AL AND[3" "]MENTAL ILLNESS.",,,,         JD
•252 DATA"  HIGH AND HONORABLE[5" "]IDEAL
 S.  AVOID DRUDGERY. NEVER RESORT"        JF
•254 DATA" TOPETTY TACTICS. PROUD AND ARR
 OGANT, SELF-INTERST.                     GF
•256 DATA"  COMPATABLE WITH OTHER  FIRES-
  1, 3, OR 9"                             MJ
```

VIC 20 VERSION

```
•10 POKE36879,26:PRINT"[BLUE]"CHR$(142)CH
 R$(8):R$=CHR$(13)                        BK
•12 PRINT"[CLEAR][DOWN]  [s V][s V]  [s V
 ][s V]  [s V][s V]  [s V][s V]  [s V][s
 V]"R$"  [s V][s V]  [s V][s V]  [s V][s
 V]  [s V][s V]  [s V][s V]"              KK
•14 PRINT"[DOWN][7" "]NUMEROLOGY"         BA
•16 PRINT"[DOWN] I WILL ANALYZE A NAME[4"
  "]OR DATE FOR ITS[5" "]MYSTICAL VIBRATI
 ONS."                                    BB
•18 PRINT"[DOWN][3" "]ACCORDING TO THE[4"
  "]ANCIENTS, VIBRATIONS CREATE CHARACTER
 ISTICS":GOSUB70                          HK
•20 PRINT"[DOWN][DOWN]  [s V][s V]  [s V]
 [s V]  [s V][s V]  [s V][s V]  [s V][s V
 ]"R$"  [s V][s V]  [s V][s V]  [s V][s V
 ]  [s V][s V]  [s V][s V]":GOSUB66       NK
•22 V=0:Z=0:N$="":A$="":PRINT"[CLEAR][4"[
 DOWN]"][BLUE]ANALYZE A NAME ([RED]N[BLUE
 ]) ,  OR A DATE ([RED]D[BLUE])?"         EE
•24 GOSUB66                               PM
•26 IFQ$<>"N"ANDQ$<>"D"THEN22             PE
•28 IFQ$="N"THEN44                        FF
•30 PRINT"[CLEAR][5"[DOWN]"]DATE TO BE AN
 ALYZED[3" "[3"-"][RED] NUMBERS[BLUE] ONL
 Y"                                       KO
•32 PRINT"(PROPER FORM WOULD BE 12 15 198
 4)":INPUT N:N$=STR$(N):FORI=2TOLEN(N$)   EF
•34 A$=MID$(N$,I,1):IFASC(A$)=32OR(VAL(A$
 )>0ANDVAL(A$)<10)THEN38                  MO
•36 GOSUB64:GOTO32                        CI
•38 IFASC(A$)=32THENNEXT                  FK
•40 Z=Z+(VAL(A$)):NEXT:Z$=STR$(Z)         ID
•42 GOTO56                                PN
•44 PRINT"[CLEAR][5"[DOWN]"]NAME TO BE AN
 ALYZED[3" "[3"-"][RED] LETTERS[BLUE] ONL
 Y"                                       KI
•46 PRINT"(PROPER FORM IS NAME  COMMONLY
 USED -FULL[3" "]NAME OR NICKNAME)":INPUT
 N$                                       CJ
•48 FORI=1TOLEN(N$):A$=MID$(N$,I,1):IFASC
 (A$)=32OR(ASC(A$)>64ANDASC(A$)<91)THEN52 HE
•50 GOSUB64:GOTO46                        CD
•52 IFASC(A$)=32THENNEXT                  FK
•54 Z=Z+(ASC(A$)-64):NEXT:Z$=STR$(Z)      IA
•56 V=0:IFLEN(Z$)<=2THEN72                EJ
•58 FORI=1TOLEN(Z$):V=VAL(MID$(Z$,I,1))+V
 :NEXT                                    IO
•60 IFV<10THENZ$=STR$(V):GOTO72           LB
•62 Z$=STR$(V):GOTO56                     NE
•64 PRINT"INVALID-TRY AGAIN":V=0:Z=0:RETU
 RN                                       CN
•66 GETQ$:IFQ$=""THEN66                   IH
•68 RETURN                                IM
•70 PRINTR$"[DOWN] HIT ANY KEY TO CONT.":
 RETURN                                   NI
•72 N=LEN(N$):N=11-(N/2):PRINT"[CLEAR][DO
 WN]"TAB(N)N$R$"[4" "]VIBRATES TO "Z$R$R$ IO
•74 Z=VAL(Z$):FORI=0TO(Z-1)*5:READB$:NEXT
 :FORI=1TO5:READB$:PRINTB$;:NEXT          JL
•76 GOSUB70                               PB
•78 GOSUB66                               PM
•80 RESTORE:GOTO22                        KN
•82 DATA,"RULED BY THE SUN.[5" "]DRIVING
 LIFE FORCE.[3" "]LEADER, AMBITIOUS,[4" "
 ]IMPATIENT"                              ED
•84 DATA",AN EXPLORER,EXTROVERT,AUTOMATIC
  TOASSUME COMMAND, "                     PN
•86 DATA"VERY  STRONG FEELING,DESERVEPRAI
 SE WHICH CAN SPUR TO"                    KH
•88 DATA" GREATER THINGS.[3" "]"          BL
•90 DATA" COMPATIBLE WITH OTHER FIRES - 1
 ,3, OR 9"                                FM
•92 DATA"RULED BY THE MOON.[4" "]SENSITIV
 E, DOMESTIC,  EMOTIONAL."                MO
•94 DATA"EASILY MOVEDTO TEARS. FERTILE[5"
  "]IMAGINATION.  FOND OF"                ED
```

```
•96 DATA" HOME. PATRIOTIC.PREFERTO LIVE N
 EAR WATER.[3" "]MUSICAL",                 AL
•98 DATA"TALENT.[8" "]COMPATIBLE WITH OTH
 ER WATER - 2,7"                           HE
•100 DATA"RULED BY JUPITER.[5" "]INVESTIG
ATOR,SCIENTISTSEEKER,MATERIAL RATHER"      KD
•102 DATA"THAN SPIRITUAL. GOOD  SENSE OF
HUMOR. TRUSTSLIKES TO KNOW WHY"            DI
•104 DATA" AND HOW. NOT INTERESTED INMONE
Y ",                                       IB
•106 DATA"COMPATIBLE WITH OTHER FIRE - 1,
3,OR 9"                                    MG
•108 DATA"RULED BY URANUS.APPEARSTRANGE A
ND ECCENTRIC.AHEAD OF HIS TIME."           IJ
•110 DATA"[4" "]INTEREST  IN OCCULT,  PSY
CHIC & OUT OF THE  ORDINARY. "             JA
•112 DATA"INTUITIVE.  SARCASTIC IF CROSSE
D. LIBERTY,EQUALITY." ,                    HE
•114 DATA"[5" "]COMPATIBLE WITH OTHER AIR
S - 4OR 5"                                 DB
•116 DATA"RULED BY MERCURY.[5" "]ACTIVE P
HYSICALLY AND MENTALLY. INQUIRING, "       AE
•118 DATA" EXPLORING. LIKES TO[3" "]READ
AND DO RESEARCH. LINGUISTIC. TEACHER,  "   JE
•120 DATA"WRITER, SECRETARY.[4" "]FRIENDL
Y, METHODICAL, ORDERLY.",                  PC
•122 DATA"  COMPATIBLE  WITH[3" "]OTHER A
IRS - 4 OR 5"                              IK
•124 DATA"RULED BY VENUS.[7" "]GENTLE,REF
INED, COMELYSOCIABLE, PLEASANT. "          EN
•126 DATA"A PEACEMAKER.DIFFICULTY IN FINA
NCES. FRIENDLY AND  AGREEABLE."            NC
•128 DATA" A GOODHOST OR HOSTESS.[6" "]",  IN
•130 DATA"COMPATIBLE WITH OTHER EARTHS -
 6 OR 8"                                   CG
•132 DATA"RULED BY NEPTUNE.[5" "]PSYCHIC,
 INTROVERT,[3" "]MYSTERIOUS. DOES NOT"     FP
•134 DATA"  SAY MUCH,BUT KNOWS[4" "]MUCH.
 DRAWN TO OCCULT.LIKES FISHING"            KN
•136 DATA". TAKES  FROM HAVES, GIVES TO
HAVE-NOTS.",                               HC
•138 DATA" COMPATIBLE WITH OTHER WATERS -
 2 OR 7"                                   KC
•140 DATA"RULED BY SATURN. COLD,PESSIMIST
IC. NO  SENSEOF HUMOR."                    EE
•142 DATA" SUCESS IN[3" "]FINANCES. ASSOC
IATED  WITH MINING, LAW, REALESTATE,"      JH
•144 DATA" CEMETERIES,[3" "]PAWN SHOPS. W
ORKS HARDCONCERN WITH THE PAST.",          FF
•146 DATA"COMPATABLE WITH OTHER EARTHS -
 6 OR 8"                                   DO
•148 DATA"RULED BY MARS.[8" "]EMOTIONAL,J
EALOUS,[4" "]ACTIVE, TIED TO FAMILY"       OO
•150 DATA"LOYAL. SUSPICIOUS OF  STRANGERS
. IMPULSIVE. AFRAID OF UNKNOWN.[4" "]"     OH
•152 DATA"ASSOCIATED WITH[7" "]SURGERY, P
HYSICAL AND MENTAL ILLNESS.[5" "]",        AN
•154 DATA"  COMPATIBLE WITH OTHER FIRES -
 1,3, OR 9"                                AI
```

"Son, it's time you and I had a little man-to-man interface."

COMMODARES

PROGRAMMING CHALLENGES

By Dale Rupert

Each month, we'll present several challenges designed to stimulate your synapses and toggle the bits in your cerebral random access memory. Please send your solutions to:

Commodares, c/o *Ahoy!*
P.O. Box 723
Bethel, CT 06801

We will print and discuss the cleverest, simplest, shortest, most interesting and/or most unusual solutions. Be sure to identify the *name* and *number* of the problems you are solving. Also show sample runs if possible, where appropriate. Programs on diskette are welcome, but they must be accompanied by listings. Also tell what makes your solutions unique or interesting, if they are. You must enclose a stamped, self-addressed envelope if you want any of your materials returned.

Your original programming problems, suggestions, and ideas are equally welcome! The best ones will become *Commodares.*

Problem #15-1: Fancy Functions

Complete these function definitions to create functions with the characteristics listed below:

```
10 DEF FNA(X) = ...
20 DEF FNB(X) = ...
30 DEF FNC(X) = ...
40 DEF FND(X) = ...
```

A) FNA(X) has the value of 0 if X is odd and the value 1 if X is even.

B) FNB(X) has the value of the area of a triangle which has three equal sides of length X.

C) FNC(X) has a random integer value between 1 and X inclusive.

D) FND(D) properly rounds the number N to D decimal places. N=9.127 : PRINT FND(1) : PRINT FND(2) gives the results 9.1 and 9.13.

Problem #15-2: Prime Factors

David Patterson (San Jose, CA) suggested this problem. Using one statement per line, write the shortest program to print the prime factors of a positive integer entered by the user. For example, if the user enters 1644, the computer prints 2*2*3*137. Prime factors are the prime numbers which may be multiplied together to give the specified number.

Problem #15-3: Separated Sentence

The user inputs a sentence. The computer breaks the sentence into two parts and prints the parts on separate lines. An example will save a thousand words. If the user inputs "PROGRAM TEST INPUT", the computer displays:

```
P O R M T S   N U
 R G A   E T I P T
```

Every other character, starting with the second, is dropped to the next line on the screen. Vertically merging the two lines would produce the original input.

Problem #15-4: String Stretcher

A classic problem assumes the earth is a smooth sphere with a circumference of 25,000 miles. A string which is one yard longer than 25,000 miles is wrapped around the earth at the equator. The extra yard of string provides slack so that the string can be raised a uniform height above the ground all around the earth. The standard question is, how high above the ground at each point would the string be?

Your challenge is to write a program which allows the user to enter the circumference of a planet of his choice. The computer calculates the height above the surface of the planet of a string one yard longer than the planet's circumference, assuming the extra yard is uniformly distributed around the planet. (The results may surprise you.)

This month we will first look at two solutions to last month's problems. Then we will look at readers' solutions to *Commodares* from the November issue.

Last month Hugh Rountree (Perry, FL) proposed *Problem #14-1: Maximus Input.* Here is his solution.

```
1 REM SOLUTION TO PROBLEM #14-1:
2 REM       MAXIMUS INPUT
3 REM    BY HUGH ROUNTREE
4 REM
10 PRINT"TYPE A WORD OR SENTENCE AND PRE
SS RETURN (255 CHAR'S. MAX)"
20 FOR I=1 TO 255
```

```
30 POKE 204,0:POKE 207,0
40 GET A$:IF A$="" THEN 40
50 IF A$=CHR$(13) THEN I=255: GOTO 90
60 IF A$=CHR$(20) THEN L=LEN(B$)-1:B$=LE
FT$(B$,L):PRINT A$;:I=I-1:GOTO 90
70 B$=B$+A$
80 PRINT A$;:IF A$=CHR$(34) THEN POKE 21
2,0
90 NEXT I:POKE 204,0
100 PRINT:PRINT B$
```

Notice how he has enabled the blinking cursor in line 30 even while the computer is sitting in a GET loop. According to the *C-64 Programmer's Reference Guide* (page 315), location 204 is the "cursor blink enable" character, and location 207 is the "last cursor blink" flag. You will notice as you run this program that the cursor still vanishes every now and then. Perhaps you have figured out a better way to handle this problem. Line 80 sets the "editor in quote mode" flag, by POKEing 0 to address 212, allowing the user to enter cursor movement characters into the input string.

Here is the solution sent by Patrick Bergin (District Heights, MD) to his *Problem #14-3: Digital Deduction,* given last month.

```
1 REM SOLUTION TO PROBLEM #14-3:
2 REM      DIGITAL DEDUCTION
3 REM    BY PATRICK BERGIN
4 REM
10 PRINT"THINK OF A NUMBER FROM 1 TO 100
0":INPUT"AND PRESS RETURN";RT$:TR=0
20 L=1:R=1000
30 IN=INT((L+R)/2):TR=TR+1
40 PRINT"IS YOUR NUMBER ";IN;" ?...Y/N";
:INPUT RT$
50 IF LEFT$(RT$,1)<>"Y" THEN 70
60 PRINT"GOT IT IN ";TR;"TRIES !":END
70 INPUT"IS YOUR NUMBER HIGHER OR LOWER.
.H/L ";RT$
80 IF RT$<>"H" THEN 100
90 L=IN+1:GOTO 30
100 R=IN-1:GOTO 30
```

His solution is based on a binary search technique. Each cycle divides the region to be searched in half (line 30) until only the sought number remains. You might try to enhance this program so that the computer can tell when the user is cheating (or, should we say, inconsistent with his responses). Can you determine the maximum number of trials required to guess a number from 1 to 10,000?

Readers have asked what the deadline is for submitting *Commodares* solutions. If you have a solution which you feel is unique, especially interesting, or which hasn't been already discussed, send it any time. Typically, this column is written four months before the publication date on the magazine. As a rule, all solutions to the March *Commodares* which are received by March 10 are considered for the July issue of *Ahoy!*. This March column is based upon letters received up to the middle of November. Your solutions are most likely to be discussed if they reach us within two weeks of the cover date of the magazine.

Frequently readers apologize for not having a printer and for sending handwritten listings. Although printed copy is easier to read (and to create), don't let the lack of a printer stop you from sending your solutions to this column. No apologies necessary. If you send your programs on disk, you should also send a listing, and hopefully some words of explanation.

Several readers tackled the fairly tough challenge of *Problem #11-1: Cray Confrontation* which was suggested by Larry Masterson (Willard, OH). The correct answer is:

```
45,994,811,347,886,846,310,221,728,895,2
23,034,301,839.
```

This is the second factor of the number consisting of 71 one's which required more than 9 hours to be factored on the Cray X-MP supercomputer. Readers of this column had an advantage over the Cray by knowing one of the factors of the original number. Consequently the times on the Commodores were significantly less than 9 hours. In fact, the assembly language solution sent by James Borden (Carlisle, PA) found the above factor in 23 jiffies. That's less than one-half second! He used the *IEA Assembler* (Robin's Software, Bloomington, MN) to write the 100-line program in four days (and nights).

Another approach with a very interesting analysis of this problem was submitted by Dana (age 11) and Cecil Rousseau (Memphis, TN). Their BASIC solution took only 13 seconds. Other excellent solutions with very respectable times were received from David DeSha (Chattanooga, TN), Edward Keller (Cincinnati, OH), and Richard Oberle (Columbus, OH). Some serious work went into the solutions from all of these readers.

The solution to *Problem #11-2: Pythagoras Extended* from Edward Keller (Cincinnati, OH) typifies several readers' approach to this problem.

```
1 REM SOLUTION TO PROBLEM #11-2:
2 REM      PYTHAGORAS EXTENDED
3 REM       BY EDWARD KELLER
4 REM
10 A=X^2+(X+1)^2+(X+2)^2+(X+3)^2+(X+4)^2
20 B=(X+5)^2+(X+6)^2+(X+7)^2+(X+8)^2
30 A=INT(A+.1) : B=INT(B+.1)
35 PRINT A,B
40 IF A=B THEN PRINT "X ="X : END
50 X=X+1 : GOTO 10
```

Line 30 is a good way to take care of inaccuracies resulting from the squaring operations, especially when

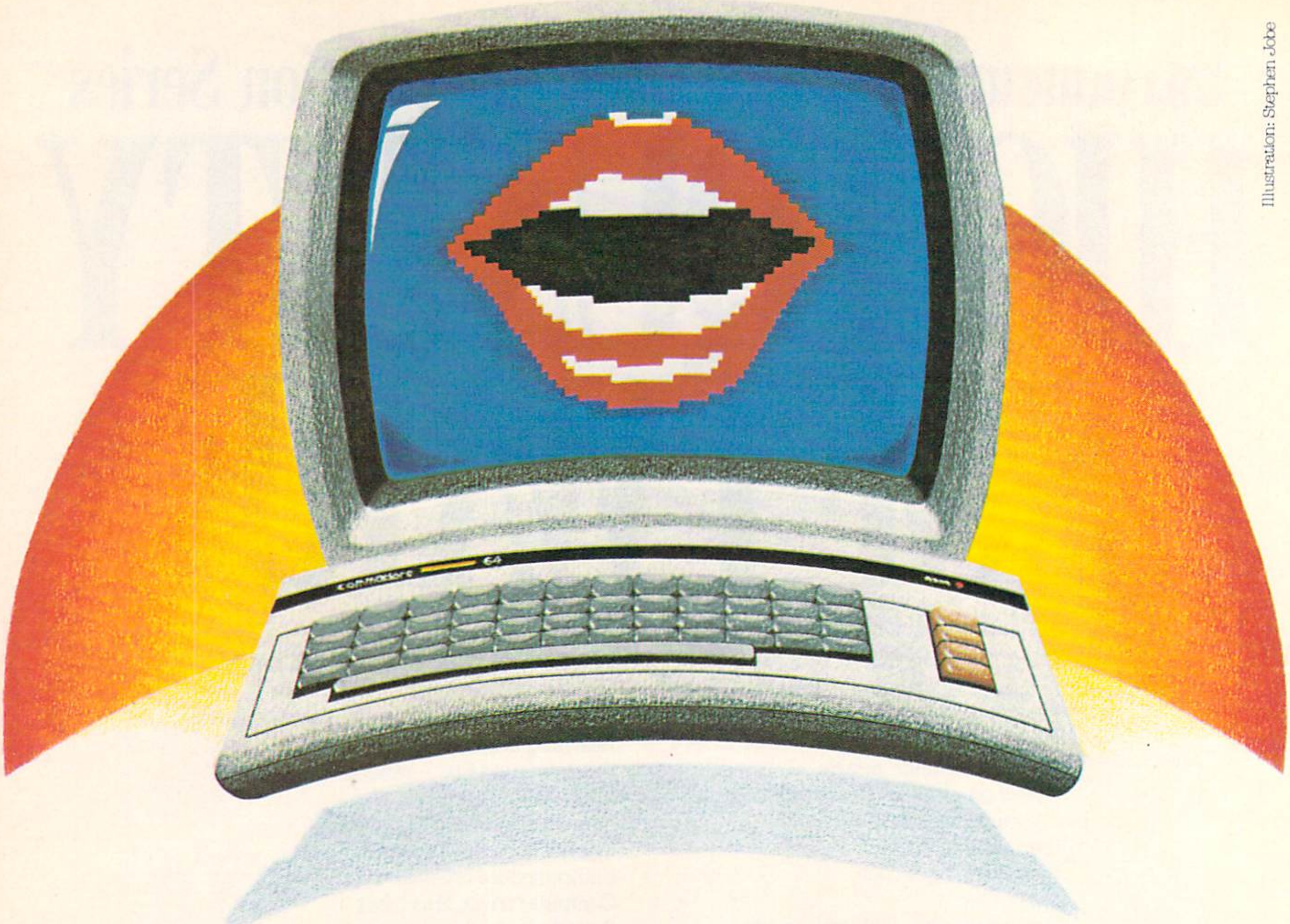


Illustration: Stephen Jobe

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the results must be compared to other values. (To see the problem, type PRINT 5 ^ 2=25 in the direct mode. The resulting 0 shows that 5 ^ 2 does not have the same value inside the computer as the number 25, for example. " ^ " is the up-arrow key beside the RESTORE key on the Commodore.)

John Desmond (Alexandria, VA) pointed out that there is another solution to this problem using values ranging from −4 to 4 in the equation in addition to the more common solution using 36 through 44. You may add line 5 X=−10 to the program above to obtain this other solution.

Mark Robin (Bloomington, MN), Geoff Krauss (Latham, NY), Michael Hooper (Tyler, TX), Dana and Cecil Rousseau (Memphis, TN), and Michael Coley (Republic, MO) all sent general solutions which not only found the next equation in the sequence but others as well.

Other readers with correct solutions to *Problem #11-2* include James Borden (Carlisle, PA), Fred Atiyeh (Livonia, MI), Edward Keller (Cincinnati, OH), and Ron Crail (Dickinson, ND).

Richard Oberle's solution to *Problem #11-3: Bug Eliminator II* is listed below:

```
1 REM SOLUTION TO PROBLEM #11-3:
2 REM      BUG ELIMINATOR II
3 REM       BY RICK OBERLE
4 REM
10 PRINT CHR$(147)
20 FOR L=1 TO RND(0)*1000
30 PRINT ".*" CHR$(157);:NEXT
40 PRINT CHR$(19)
50 M=1024:BG=ASC("*"):SQ=ASC("0"):P=ASC(
".")
60 M=M+40 : IF PEEK(M)=P THEN 60
70 M=M-40
80 M=M+1 : IF PEEK(M)<>BG THEN 80
90 POKE M,SQ : REM *SQUASH!*
100 PRINT "GOT 'EM"
```

Rather than sequentially PEEK every screen location to find the bug, he took a shortcut. If you can't figure out what's happening from the listing, you might put GOSUB 200 in front of the IF statements in lines 60 and 80, and add these lines to the program:

```
199 END
200 A=PEEK(M) : POKE M,63
210 FOR Q=1 TO 50 : NEXT
220 POKE M,A : RETURN
```


Julius Cucci (No. Plainfield, NJ) and Marshall Stewart (Shreveport, LA) both sent machine language solutions to rapidly eliminate the bug.

Problem #11-4: Word Value drew the largest response from readers. Among the tidiest solutions was the following one from George Poole (Buffalo, NY):

```
1 REM SOLUTION TO PROBLEM #11-4:
2 REM        WORD VALUE
3 REM     BY GEORGE POOLE
4 REM
10 PRINT CHR$(147)
20 INPUT " ENTER WORD ";A$
30 FOR I=1 TO LEN(A$)
40 B$=MID$(A$,I,1)
50 A=A+ASC(B$)-64
60 NEXT
70 PRINT " AVERAGE VALUE IS";A/LEN(A$)
```

Michael Marron (Stony Brook, NY) and Richard DeMello (Portland, MI) combined the statements in lines 40 and 50 like this and thereby used one less variable:

```
40 A = A + ASC(MID$(A$,I,1)) - 64
```

Many readers had solutions somewhat similar to these. Readers not mentioned above who sent solutions to *Problems #11-3* and *#11-4* include Fred Atiyeh (Livonia, MI), James Borden (Carlisle, PA), Edward Keller (Cincinnati, OH), Ron Crail (Dickinson, ND), Alan Davenport (Salem, OR), Frank Gourley (Kenesaw, NE), Howard Anthony (St. John's, Nfld.), Larry Cox (Tecumseh, MI), Jim Root (Whitmore Lake, MI), John Peters (Wenatchee, WA), Vinny Amodeo (New Hyde Park, NY), James Dunavant (Gainesville, FL), Douglas Tyler (Holloman AFB, NM), Karl Hirsch (Backsdale AFB, LA), and John Auresto (Carmel, NY).

Other solutions to October's problems were received from Sheldon Wotring (Palmerton, PA), David Patterson (San Jose, CA), Dennis Sardi (Marlborough, CT), Michael Griffin (Olancha, CA), and Barbara Wolfe (Jacksonville, FL).

The cleverness award this month goes to Richard Lodge (Kirkwood, MO) for his *Roman Numeral* solution from the October *Commodares.* His program gives the user the option of receiving instructions in English or in Latin! (According to his listing, "NUMEROS ROMANOS" is a Latin form of "Roman Numerals"—just in case your Latin is a little rusty.) And we thought FORTRAN was an old language for computers!

A special thanks to Barry Vincent of Tokoroa, New Zealand for his letter and notes on *Commodares Problem #6-4: Graphic Rectangle.* He correctly pointed out that the solution in the July *Commodares* needed some additional statements to properly handle a rectangle 40 characters wide. *Ahoy!* and Commodore computers are certainly far-reaching.

Have fun with these challenges. See you next month. □

Continued from page 20

fix the error *before* RUNning it again. It makes life interesting–I know, since I had to do that more than a few times myself.

I don't recommend that you do this sort of memory manipulation all the time. But in this case, it allows you at least 7K in which to add the few routines necessary to turn a fun game milieu into a fun game.

At which someone will no doubt ask (such skeptics you are!), "If it only takes a few routines to turn it into a fun game, why didn't you put in those routines yourself?"

To which I answer, "This is a column about how to program games, not a column that *provides* games. If I did everything, what would be left for you?" Though there's another secret reason that has to do with a serious character flaw and one of the seven deadly sins.

NOTES ON PLAYING

After you have SAVEd and RUN *Mansion Display Setup*, thereby creating the file DISPLAY DATA, and after you have SAVEd *Mansion Game,* you are ready to play. LOAD *Mansion Game* and RUN it. It will fill the screen with a message to would-be detectives, then automatically LOAD the DISPLAY DATA file and set up to play.

Then it asks how many players you want. Enter a number from 1 to 6. After you press the number key, you get a chance to change your mind. When you confirm your choice, the screen flips to the main entrance of the mansion, where up to six player-figures are lined up in a row.

The bottom line of the screen tells which player's turn it is and what room he or she is in. That player moves by using the SHIFT and COMMODORE keys for left-right movement, and the f5 and f7 keys for up-down movement. Experimentation will show you what happens when you go all the way up or down a flight of stairs. Exploration will show you all the rooms in the house.

After you have moved 75 times, your turn automatically ends; or, by pressing the SPACE bar, you can end your turn early. The computer then flips to whatever screen the next player's figure is on and displays the player's number and the room his or her figure is in. You cannot move through another player's figure, so sometimes one player can effectively block another from getting through a tight place.

The game, as it stands, never ends. To end the game and stop the program, press RETURN. The screen asks you if you want to quit this game. If you press Y, the screen then asks you if you want to play again. If you press Y this time, you are asked how many players you want, as before–but you don't have to wait for DISPLAY DATA to reload, since the program "knows" that it's already in memory. If you press N, however, all the pointers are reset to normal, RUN/STOP and RESTORE are reenabled, and the program ends. Then if you want to play again, you have to RUN the program from the beginning.

NOTES ON TYPING

Just a couple of hints. When you're typing the DATA statements that create the screen displays, there are quite a few graphics characters. All of them are created by pressing a regular alphabetic key (A through Z) plus the SHIFT key. Some of them are very easy to get confused. On the program listing in this issue, SHIFT-B, SHIFT-G, SHIFT-H, SHIFT-T, and SHIFT-Y are all vertical bars. Look closely to make sure you're getting the right one. Likewise, SHIFT-C, SHIFT-D, SHIFT-F, and SHIFT-R are all horizontal lines. There are several places–particularly involving SHIFT-B, SHIFT-G, and SHIFT-H–where different characters appear in rapid succession.

Also, remember that in the packed-data scheme, characters can mean different things, so it's vital that you type everything correctly. Leaving out a character can cause the wrong character to be interpreted as the code for a number of repetitions, causing at best a messed-up screen or at worst a crashed program.

And, as always, don't type in the REM statements. Any line in which the line number is immediately followed by a REM is included only so you can more easily follow what the program is doing. Typing them in only slows the program down and creates unnecessary work for you. Good programmers almost *never* have a GOTO or GOSUB refer to a REM line.

WHAT ABOUT NEXT MONTH?

The weary columnist who has just finished a long week of programming looks at this question out of low-lidded yellow eyes and mutters, "What *about* next month?"

Come on, you think I can do a massive 84-sector program complete with a data-packing language *every* month?

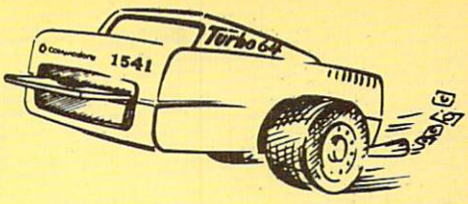
Not a chance. The best we can hope for is an introduction to reading the joystick. And, of course, the normal scintillating, razor-sharp wit and brilliantly perceptive reviews. If I can remember how to scintillate...

And to those of you who are waiting with bated breath for me to do sprites, I offer the promise: Soon. Not next month, because I have two overdue novels to finish and my children have forgotten my name. But soon. ☐

SEE PROGRAM LISTING ON PAGE 66

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The Doc-Disk Doctor that reads code under errors.

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Sync Reader-Check for Sync bits on **any** track out to 41.

Change Drive No.-Changes drive number (7-30).

Disk Logger-Finds starting track, sector; start and end addresses.

Disk Match-Compare any two diskettes. Byte for Byte.

New Wedge-Easier to use DOS wedge.

ID Check-Check ID's on **any** track.

Unscratch-Restore a scratched file.

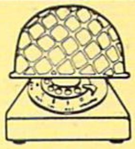
View RAM-Visual display of the free and used sectors on a diskette.

Read/Write Test-1541 performance test.

Repair a track-Repair a track with checksum errors. Reads code under errors and restores track.

Fast Format-Format a disk in just 10 seconds (with verify!).

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Printer Interfaces
for the Commodore Computers

By Morton Kevelson

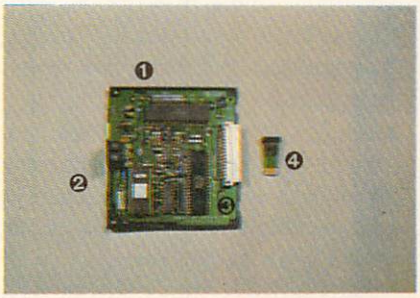
This marks the conclusion of our three-part update on printer interfacing, beginning with December's 1525 tutorial, continuing with February's introduction to interfacing and indepth reviews of Turboprint/GT, Grappler CD, MW350, and Easy Print, and concluding this month with reviews of the Okimate 10 with Plug 'n Print, Xetec GPI, Xetec SPI, Cardco Card?/+B, Card?/PS, and Card?/+G, and the Tymac Connection.

CONCLUSION

Interface	Plug 'n Print
Price: Interface Printer	 $ 69.00 $169.00
Buffer	256 byte
Speed	60 characters per second unidirectional
Printer optimization:	Okimate 10
Warranty	90 days; $55 flat rate for out of warranty service
Manufacturer	Okidata Mt. Laurel, NJ 08054 609-235-2600



The Okimate 10 Color Printer, side by side with its attendant ❶ user-replaceable thermal print head and ❷ Plug 'n Print module.
READER SERVICE NO. 268



Plug 'n Print closeup: ❶ jumper plugs to change device no. and control linefeeds; ❷ serial port connector; ❸ Okimate 10 internal connector; ❹ thermal print head.

THE OKIMATE 10 COLOR PRINTER

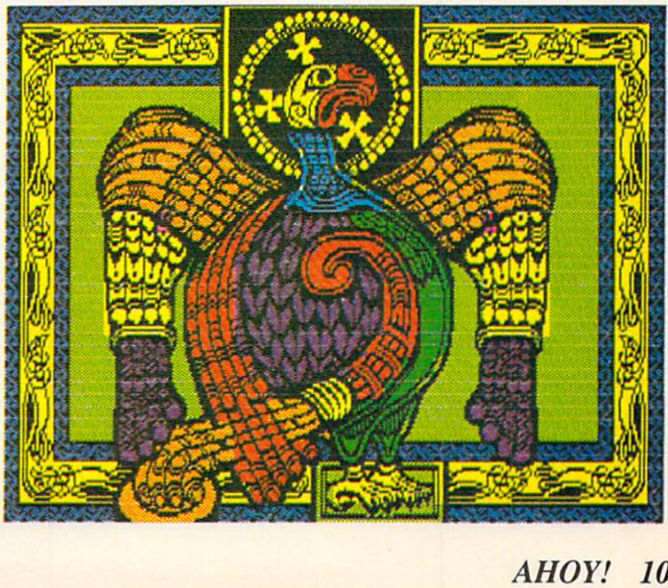
You may well wonder why we're reviewing a printer as part of a printer interfacing report. When we contacted Okidata for the loan of a Microline 92 printer for this report, they suggested we review the Okimate 10 as well. At the very least, they were interested in our opinion as to how the Okimate 10 measured up as a printer interface, since it is not a Commodore product.

In all fairness, it would not be proper to discuss the emulation capabilities of the Okimate 10 without looking at the printer details as well. As a result, we felt this would be the proper place to present a review of the entire package.

ENHANCED FEATURES

The Okimate 10, with the Commodore Plug 'n Print module, provides total emulation of the Commodore 1525 printer. Aside from the color capabilities, which we will get into later, the Okimate 10 has several features in addition to those available on the Commodore 1525. Along with the standard 10 characters per inch (cpi) and the expanded 5 cpi, the Okimate 10 supports fine printing (17.1 cpi) and bold printing (8.5 cpi). The character matrix is in a nine by nine dot format with true two-dot descenders.





Celtic Eagle by Wayne Schmidt, onscreen (above) and on an Okimate 10 color printout. The printer will read color files from a number of commercial drawing packages, or user-generated multicolor files in the proper format.

The dot shape is square rather than round. This causes vertical and horizontal lines to appear as solid strips. However, the diagonal parts of the characters are a bit rougher than conventional dot matrix printers.

Page formatting has been enhanced as well. The Okimate 10 can position the paper in vertical increments of 1/144 of an inch up to 256/144 of an inch.

THE HARDWARE

The printer is a compact 13 inches wide by 7½ inches deep by 2½ inch-

es high. The Plug 'n Print interface module is a separate unit that is inserted into a slot on the left hand side. A cover plate completes the installation. A jumper plug on the interface module allows the printer to be configured as either device four or device five. A second jumper plug turns automatic line feeds on and off.

The printer uses a thermal printhead which can print on thermal paper without a ribbon. Print ribbons are available in plug-in cartridges similar to an oversized cassette tape. The mylar single-pass ribbons carry a heat-sensitive wax-based ink past the printhead. Although any type of paper can be used, the manual recommends avoiding paper with rag content. A glossy finish thermal transfer paper works best. When we tried printing on our usual stock, the results were not uniform.

The Plug'n Print module comes in a kit with the instruction manual, a small supply of paper, a black ribbon, and a color ribbon. Also included is a floppy disk and a cassette tape with a tutorial and screen dump program. Extra paper is available from Okimate at $9.95 for 250 sheets. Replacement ribbons are $6.69 for color and $5.95 for black.

For text, the black ribbon has a capacity of 120,000 characters, or about 75 pages of double-spaced text. The color ribbon has a capacity of 35,000 characters, or 10 color screen dumps. Thus, a color screen dump will cost about 75 cents.

COLOR PRINTING

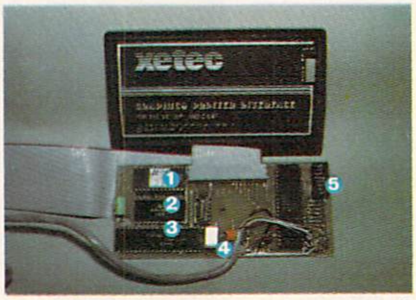
The big news, of course, is the color capability. Although the printer will not win any prizes for speed, the results are impressive enough. The screen dump program works with both multicolor and high resolution images. It is designed to read color files created by a number of commercial software drawing packages available for the Commodore 64. These include *DOODLE!*, *Koala Painter*, *Peripheral Vision*, *Super Sketch*, *Flexidraw*, *Paint Magic*, *Chalkboard*, and *Sorcerer's Apprentice*. The program will also accept user-generated multicolor files if they are in the proper format. See the October and November 1984 issues of *Ahoy!* for a detailed discussion of nearly all of these programs as well as the structure of their image files and a detailed discussion of bit mapped graphics on the Commodore 64.

The color printouts are a faithful reproduction of the original screen color, at least with the samples we tried. Multicolor images, such as from Koala, are 8 inches wide by 5½ inches high. Printing time for a multicolor image is about 30 minutes. High resolution images, such as from *DOODLE!*, are 5⅜ inches wide by 4⅛ inches high. Printing time for a high resolution image is about 17 minutes.

The color printing operation is quite fascinating. The color ribbon actually consists of sequentially ordered strips of yellow, magenta, and cyan ribbon. Each group of three segments is separated by a clear band which is used as a reference starting point for the printer. It takes three passes of the printhead to print a single color line. By varying the density of the color dots of each of the three primary colors, any of the Commodore 64's sixteen shades can be produced. This also explains the relatively short life of the color ribbon. An entire group of the three color segments is used up for each line of color regardless of the actual printed width of the line.



Provides total emulation of 1525.
READER SERVICE NO. 269



Inside Xetec GPI: ❶ 4K interface ROM; ❷ 2K RAM buffer; ❸ 6802 microprocessor; ❹ interface clock crystal; ❺ setup switches

THE DOCUMENTATION

The manual, which is geared for the beginner, is thorough and easy to follow. Numerous examples and illustrations take the user through the initial setup and use of the printer. Those wishing to do their own color programming are apt to be somewhat disappointed. The information on color printing is not much more detailed than what was given above. Although the concepts are fairly simple, it will take quite a bit of experimentation to learn the proper dot patterns which will mix the primary ribbon colors to the desired shades. There is clearly room here for a programmer's utility which will do most of this work.

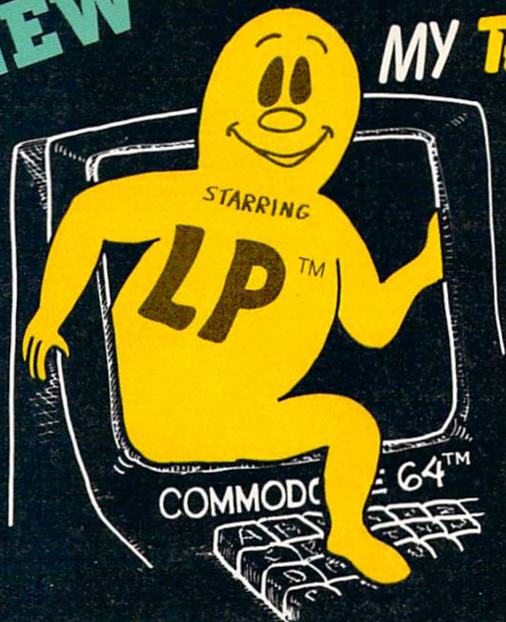
CONCLUSIONS

The Okimate 10 is not a high speed, near letter quality, heavy duty dot matrix printer. However, for the home user for whom it is intended, it represents an excellent value. It will make a fine choice as a first printer for a growing home system or a color printer in a more advanced system. Teamed up with a C-64, it will add another dimension to the enjoyment of home computing. □

Interface	Xetec Graphic Printer Interface
Price	$89.95
Buffer	2K
Printer Optimization	Okidata, Star/Epson
ROM Version Tested	1.4
Warranty	5 years
Distributor	Xetec, Inc. 3010 Arnold Road Salina, KS 67401 913-827-0685

XETEC PRINTER INTERFACE WITH GRAPHICS (GPI)

The Xetec GPI provides total emulation of the Commodore 1525 printer when used with a compatible, graphics-capable dot matrix printer. It is optimized for use with the Okidata and the Star/Gemini type of printers. The built-in two-kilobyte buffer allowed smooth and rapid printing of the Commodore graphics characters without excessive head



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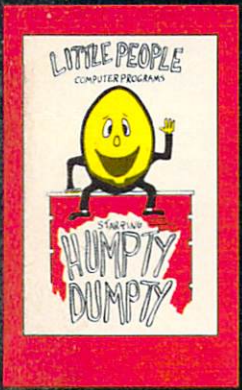
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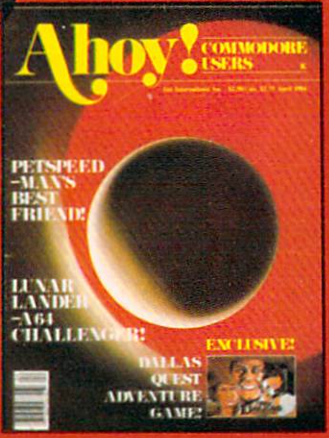
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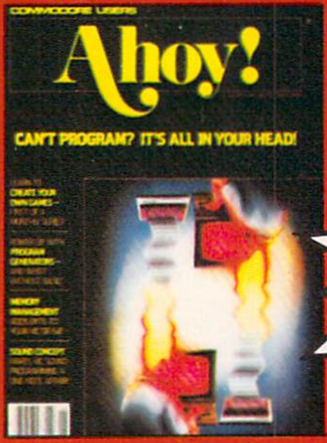
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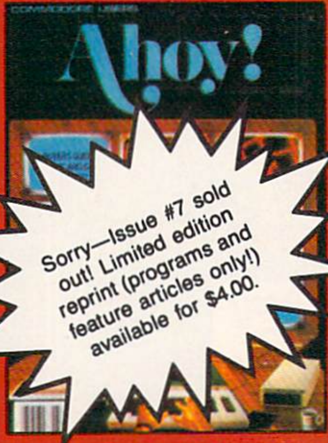
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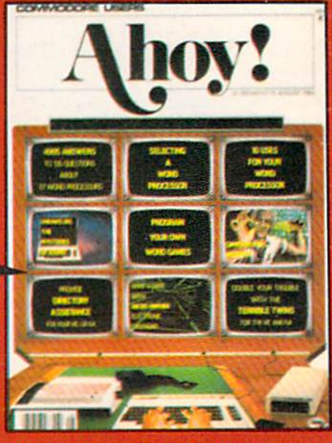
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shuttling. Since the interface only stores a single character set in its built-in 4K ROM, the Commodore graphics when printed on the C Itoh printer, were narrower than the printer's built-in characters. The result is a loss of alignment when mixing text and Commodore graphics on the C Itoh printer.

Matching aspect ratio of all characters on the C Itoh printer can be obtained by printing all characters (text and Commodore graphics) from the interface's built-in ROM. However, this results in approximately 107 characters on an eight-inch line. The results are usable but not optimum. We evaluated the interface based on its performance with the Okidata 92 and Gemini 10X printers, which both gave good results.

ENHANCED FEATURES

As with all of the interfaces, the basic GPI operating modes are accessed with a specific secondary address. The GPI also includes a unique command channel for controlling many of its enhanced features. This command channel, available with secondary address 15, is very similar to the disk drive command channel. There is no problem regarding conflicts with the latter since the file number and device number are different.

The GPI has several listing modes. The default mode prints all the Commodore graphics characters except for the control codes, which are listed as mnemonics. Optional modes allow for printing all graphics characters as either their keystroke sequence or their mnemonics. Readability in this mode is as good as with the MW350 above. Graphics characters may also be listed as their decimal ASCII codes.

The command channel supplies the user with a number of additional features. These include setting of page length, skipping over perforations, and the setting of line width but not the left or right margins. Note that the interface default condition on power up does not provide total emulation of the 1525 printer. One of the command channel functions set the interface to total emulation.

To assist with the debugging of printer routines, the GPI includes a monitor mode on secondary address 3. The monitor listing prints all characters as their equivalent two-digit hexadecimal ASCII codes. Thus a carriage return is listed as "0D". This mode is turned on and off via the command channel.

The command channel adds a lot of flexibility to the operation of the interface. It allows for software reset and reading of the hardware switches without powering down the interface. The control of the interface is further enhanced as it supports several open channels at once. The result is very flexible operation.

The remaining software control features include automatic line feed toggle, transparent operation, and software lock of the secondary address. Printers not listed in the manual can be accommodated as well. One of the command channel functions is used to send 18 data bytes to customize the interface for printers which are not directly supported. Contact Xetec for the proper codes for your printer.

THE HARDWARE

The interface is housed in a flat plastic case roughly three by six inches. The case appears to have been originally intended for use as a game cartridge for the VIC 20. Connection to the computer is via an unshielded multiconnector four-foot cable. The printer connection is via an eighteen-inch flat ribbon cable terminated with a standard Centronics connector. The overall connection was a bit shorter than with the other interfaces. Power is normally taken from the computer's cassette port via the supplied wire and connector. Xetec will supply an alternative joystick port connector for the SX64.

A cutout in the cover permits easy access to the seven miniature switches, one of which is not used. Three of the six switches are used to configure the interface for your particular printer. Of the eight possible switch combinations, only four are implemented. A universal setting for non-dot matrix printers is not available. This mode can be accessed under software control.

The three remaining switches are for hardware setting of automatic line feed, device number four or five, and transparent mode. These settings are important when using cartridge-based software, or any of the programs which do not permit issuing of the proper command codes.

The interface lacks a hardware reset button. Most of the reset button functions can be implemented under software control via the command channel. The most obvious restriction is the inability to clear the text buffer to halt printing.

CONCLUSIONS

For users of the Okidata and Star/Epson type of dot matrix printers, the Xetec GPI is a good buy. It offers more per dollar than any other interface. The five-year warranty makes it especially attractive. ☐

Interface	Xetec Serial Printer Interface
Price	$59.95/$69.95 with buffer
Buffer	2K optional
Printer Optimization	ASCII, non-graphic
ROM Version Tested	1.4
Warranty	5 years
Distributor	Xetec, Inc. 3010 Arnold Road Salina, KS 67401 913-827-0685

XETEC SERIAL PRINTER INTERFACE

The Xetec SPI is not a graphics interface. We have included it in this report because of its unique "daisy wheel emulation" mode which produces near-letter quality print when used with a Gemini, Epson, or Panasonic printer. We tried this feature out with a Gemini 10X and were favorably impressed. The five print styles shown were made with the interface and the Gemini 10X:

```
Basic dot matrix mode.
Emphasized mode.
Double strike mode.
Both modes in active.
Daisy wheel emulation
mode.
```

The near-letter quality print is generated entirely by the interface, using the high-density dot capabilities of the printer. The results are impressive. The drawback is that printing

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in this mode is slowed up considerably. Each line of text requires two passes of the print head. Since the printer can only operate unidirectionally in graphics mode, an additional two-to-one speed penalty is incurred. The result is on the order of a four-to-one speed reduction when comparing the "daisy wheel emulation" to basic dot matrix.

ENHANCED FEATURES

The SPI (and the SPI+ with the two-kilobyte buffer) is a basic printer interface without graphics capabilities. It is very similar to the Xetec graphic interface above. The same command channel, on secondary address 15, is available to control the unit. A number of the advanced features are carried over as well.

These include the highly legible listing mode, with keystroke identification of graphics characters and multiletter mnemonics for Commodore control codes. The monitor listing mode with hexadecimal dump of all characters is included as well. Not included are the automatic pagination and width commands of the graphic interface.

THE HARDWARE

Packaging is very similar to the graphic model in a VIC 20 cartridge case. Four miniature switches are accessible in a cutout in one corner. The switches allow hardware selection of device number 4 or 5, transparent mode, and automatic line feeds. The fourth switch sets the interface to either standard ASCII or Okidata printer mode.

CONCLUSION

The Xetec SPI is a reasonably priced, enhanced basic interface. It will be of greatest interest to users of the Star/Epson type of printers.

In addition to these two interfaces, Xetec has indicated they are working on two more. One of these will be a bare bones interface without the daisy wheel mode of the SPI. The other will be a deluxe graphics interface which will include the daisy wheel mode as well as additional features. The company intends to expand the onboard ROM to eight kilobytes to allow optimization with all printer types.

FONTMASTER

Although this utility program from Xetec will not be available in this form, we found it interesting enough to include with this report. A modified version of this software will be included as part of a word processor, which should be available about the time you are reading this.

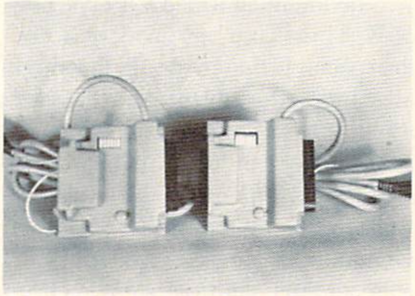
The program is intended for use with a Gemini 10X printer. It uses the printer's high-density graphics capabilities to create a variety of type fonts. The examples following speak for themselves. Contact Xetec for details.

The BLOCK font.
¢▬▚╯U¥u£§ä¼╯▞■▟├◆
The MIRROR font.
The UPSIDE DOWN font.
The HAIRPIN font.
The BOLD font.
The PUDGY font.
The SCOP Font.
The ENGLISH font.
The SCRIPT font.
The ITALIC font.
The MANHATTAN font.
The SHADOW font.
The SCOPBOLD Font.
The BAUHAUS font.
The BYTE font.

Interface	Card?/+B Card?/PS
Price	+B=$59.95 PS=$79.95
Buffer	none
Printer Optimization	ASCII, non-graphic
Warranty	Lifetime
Distributor	Cardco Inc. 300 South Topeka Wichita, KS 67202 316-267-6525

CARDCO CARD?/+B & CARD?/PS INTERFACES

The Cardco model B is a basic non-graphic interface. It performs the fundamental tasks of matching the hardware and ASCII codes between the Commodore computer and a standard printer. The model PS is functionally identical to the model B with one major enhancement. The Card?/PS is equipped with both a Centronics parallel port and an RS232 serial port. To our knowledge, the model PS is the only interface currently available which will permit the use of an RS232 printer on the Commodore serial port.



The Cardco Card?/+B and Card?/PS differ in one respect: the PS has both Centronics parallel and an RS232 serial ports.
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ENHANCED FEATURES

The model B and model PS are basic printer interfaces without graphics capabilities. All Commodore graphics characters are translated to either a two-letter mnemonic in the case of control codes, or into the character's ASCII code. This translation takes place only when the interface is in quote mode (that is, after an open quote mark has been sent to the printer).

When writing a Commodore BASIC program, graphics characters and control codes will appear only between quotation marks. Cardco takes advantage of this fact to place the interface into its listing mode. The problem occurs when running a program which may try to send some Commodore graphics characters to the printer. Since quotation marks are not normally sent by PRINT statements, the interface passes the codes on to the printer. The result is usually gibberish at best. If the characters correspond to some of your printer's control codes, the printer may end up doing some strange things. These interfaces are best-suited for straight text applications or for use with letter-quality printers.

THE HARDWARE

The Cardco interfaces are very compact. The entire works fit in a package not much larger than the printer connector. Actually this connector is an integral part of the package. The interface is installed right at the back of the printer. Connection to the computer is via an unshielded multiconductor cable to the serial port. Interface power is derived from the cassette port.

The interface package has been redesigned to permit easy access to the

miniature switches. These switches allow selection of printer device number, auto line feed, and transparent mode. For the model PS, these switches also perform baud rate selection in the RS232 mode, as well as selection between Centronics and RS232 operation. □

Interface	Card?/+G
Price	$89.95
Buffer	none
Printer Optimization	C Itoh, Okidata
Distributor	Cardco Inc. 300 South Topeka Wichita, KS 67202 316-267-6525

CARDCO CARD?/+G GRAPHICS INTERFACE

We first looked at the Cardco model G graphics interface in the April 1984 issue. Since that time, a few minor improvements have been made. Of greater significance was the chance to try out the interface with the C Itoh printer, for which it is optimized. We also found that the +G gave acceptable performance with the Okidata 92 printer.

ENHANCED FEATURES

The model G provides total emulation of the Commodore 1525 printer when used with a compatible dot matrix printer. The interface performs best with a C Itoh 8510 or equivalent printer, as it is optimized for the printer's eight-dot character pattern. Also, the speed of this type of printer is not affected by the lack of any interface buffer.

Operation with the Okidata 92 is acceptable. Commodore graphics characters are printed with the proper aspect ratio. However, the absence of a printer buffer slowed down graphics printing.

Basic operating modes are chosen by the secondary address of the OPEN command. These include total 1525 emulation in both upper case/graphics and upper/lower case mode, as well as transparent mode. All modes may be selected with and without line feeds. The total text listing mode is not software selectable; by adding twenty to the secondary address, the interface may be locked into that mode.

The interface monitor mode is available via secondary address 3. All characters sent to the printer are listed as their hexadecimal equivalent. This is very useful for debugging printer routines.

Secondary address 6 prints all characters from the interface's internal character generator ROM. This insures a uniform aspect ratio of both the standard text characters and the Commodore graphics characters. All characters are printed in an eight-dot-wide matrix in this mode. When used with the Gemini 10X, this mode produced only 60 characters per line.

THE HARDWARE

The Card?/+G is packaged in a three-and-one-half- by five-and-one-half-inch plastic case. Connection to the computer is via a six foot unshielded cable to the serial port. Power to the interface is derived via a separate wire and connector from the computer's cassette port. A 15" flat ribbon cable, terminated with a Centronics connector, leads to the printer.

A set of eight miniature switches configure the interface for the different operating modes. Five of these switches are used to select four different printer types. If these switches are all turned on, the interface will revert to total text mode. Operation will be identical to the Cardco model B. This is the only way to access the special listing mode. In this mode all Commodore print control codes are listed as two-character mnemonics. All other unprintable characters are listed by their ASCII codes.

The remaining switches select device number four or five, transparent operation, and automatic line feed.

CONCLUSIONS

The Card?/+G is a basic graphic interface which provides total emulation of the Commodore 1525 printer. Optimum performance is obtained when used in conjunction with a C Itoh type printer. The lack of a buffer will slow this interface down when used with the Okidata or the Star/Epson type of printers. □

Interface	Tymac Connection
Price	$119.95
Buffer	2K
Printer Optimization	Customized
ROM Version Tested	1.5
Distributor	Tymac Inc. 127 Main Street Franklin, NJ 07416 201-827-4050

THE TYMAC CONNECTION

We first looked at the Tymac Connection graphics interface in the April 1984 issue. In view of its outstanding performance at that time we felt we should mention it again. Historically speaking, the Connection is the forerunner of the MW350. Both interfaces were designed by Bob Kovacs. So it is not surprising to see a definite similarity in the performance and the features of these two products. We will not go into a detailed review of the Connection at this time. We will point out the following:

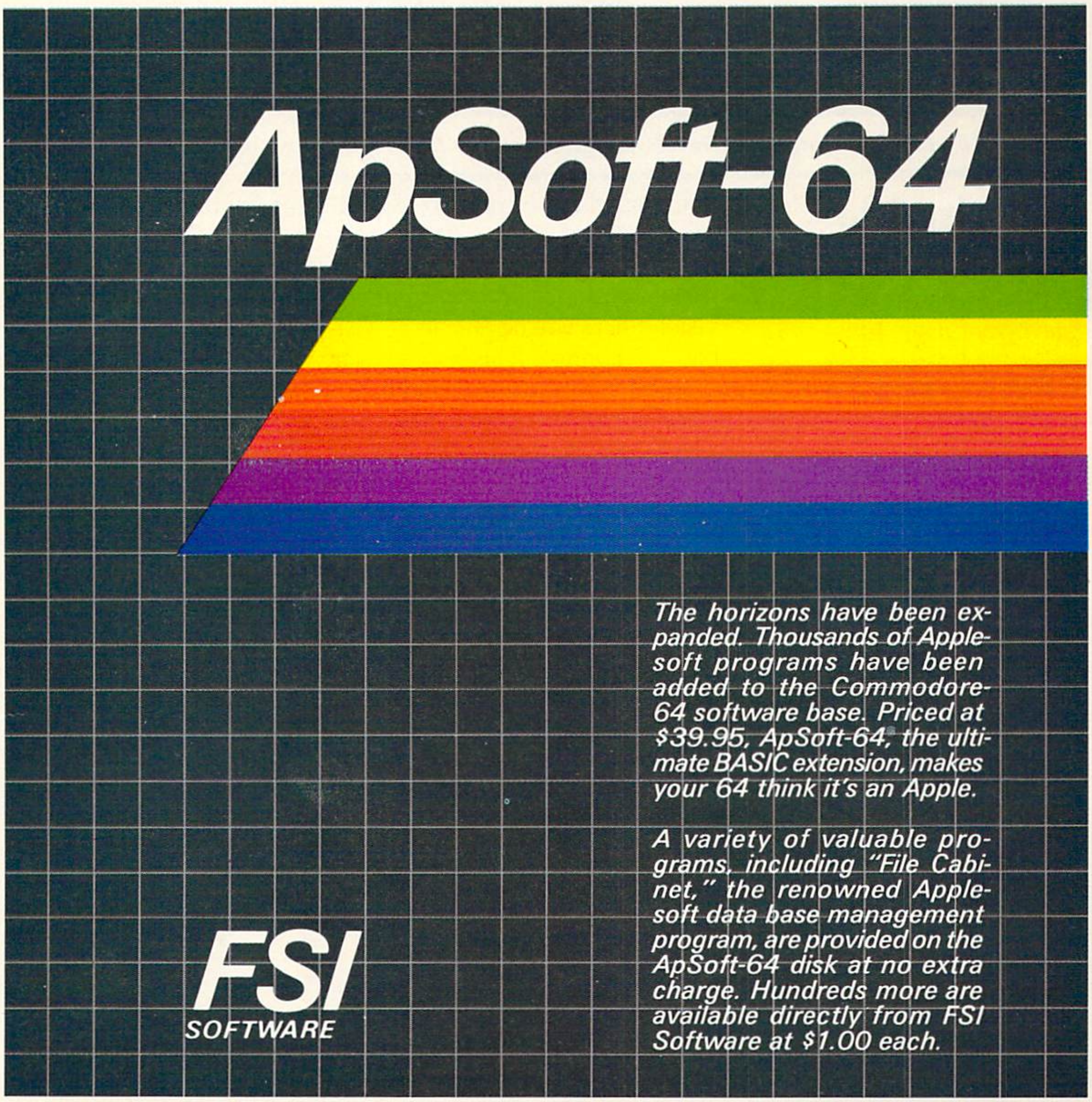
The Connection is a custom interface. You will have to specify your printer when ordering so that the proper ROM will be supplied. This will of course result in optimum performance with your particular printer. This also means that if you change printers you will have to order a new ROM for the interface.

The built-in two-kilobyte buffer allows optimum performance with all printer types. We only looked at the Star/Epson ROM, but expect comparable performance with other models. The Tymac produced total emulation of the 1525 printer with the exception of reverse characters, which are printed underlined.

Overall, the Connection is a well-designed, solid performer. Its lack of popularity has been mainly due to dealer reluctance to stock the selection of ROMs needed for all the different printer types. □

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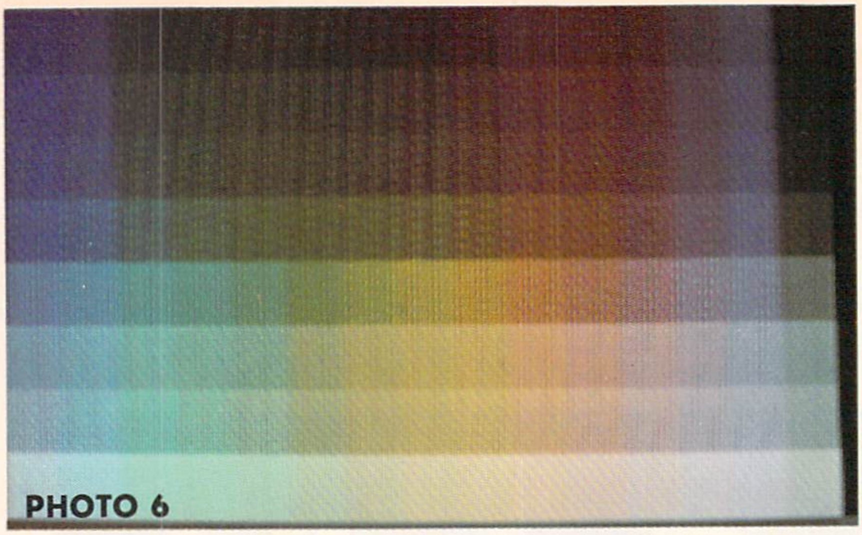
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The Plus/4's 16 colors X 8 intensity levels equal 121 hues (see text).

What's Inside the Plus/4?

Continued from page 30

es, and other sounds for games and other applications.

GRAPHICS AND DISPLAY

No boon for 80-column advocates here – the Plus/4 display is the usual 40 columns by 25 lines. The display area has been adjusted to better utilize the screen surface. On most televisions there will be little or no visible side borders. This may present a problem with some televisions. The Plus/4 allows for this eventuality by a software display width control. This restricts the output to 38 of the available 40 columns. Additional control is available via the window command mentioned below.

As with the C-64, the display has two bit-mapped modes. High resolution graphics allows for 320 horizontal by 160 vertical pixels. Multicolor graphics supports 160 horizontal by 200 vertical pixels. Color tradeoffs between the two modes are similar to those on the C-64. As a result, the Plus/4 will lend itself nicely to the sort of computer graphics programs reported on in the October and November 1984 issues.

The TED chip enhances the display of text as well. Individual characters can be set to flash or blink between normal and reverse display – a handy attention-getting device. An area of the screen can also be designated as a window. When a window is defined, all output, listings, and data will be restricted to a user-designated rectangular screen area. This feature works in both immediate and program modes.

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built-in BASIC. This starts up with a whopping 60,671 bytes free. We must offer one word of caution: the use of any of the built-in high resolution graphics capabilities steals 10 kilobytes of RAM storage from the program space. Keep this in mind when developing any really long programs. We cannot go into full detail on all of the aspects of BASIC 3.5 at this time. However, the accompanying table lists all of BASIC 3.5's enhancements as compared to BASIC 2.0. We think the table speaks for itself.

The Plus/4 also includes a built-in machine language monitor (TEDMON). This is not a simple program such as the ones included with the early CBM/PET computers. It is a full-featured utility. Included are a single line assembler/disassembler as well as all of the usual memory display and manipulation features.

SOFTWARE COMPATIBILITY

The big question is, is the Plus/4 compatible with existing C-64 software? The answer is yes and mostly no. The data format is the same as for all other Commodore machines, so existing programs and files can be LOADed without any problems. However, the internal architecture is different. As a result, machine language programs will require some work before they can be used. This

BASIC 3.5 EXTENSIONS v. BASIC 2.0

Programmer's Aid

AUTO [increment]—automatic line numbering with specified increment

DELETE [line#][- line#]—deletes specified line or range of BASIC lines (direct mode only)

HELP—displays line with BASIC program error

KEY [key#, string]—assigns string to specified function key

MONITOR—calls the built-in machine language monitor

RENUMBER [new starting line#[, increment[, old starting line#]]]—renumber BASIC program (direct mode only)

RESUME [line#/NEXT]—continues program after TRAPping an error

TRAP [line#]—intercepts BASIC program errors, branches to specified line#

TRON—trace mode, displays line# of currently executing BASIC statement

TROFF—turns off trace mode

DOS Support

The disk drive command channel (secondary address 15) is automatically OPENed by these commands.

BACKUP Ddr# TO Ddr# [,ON Udv#]—duplicate command for dual drives

COLLECT [Ddr#][,ON Udv#]—same as BASIC 2.0's VALIDATE command

COPY [Ddr#,] "source file" TO [Ddr#,] "dest. file" [ON Udv#]—same as BASIC 2.0

DIRECTORY [Ddr#][,Udv#][,"filename"]—displays disk directory without affecting current program

DLOAD "name"[,Ddr#][,Udv#]—LOAD from disk

DSAVE "name"[,Ddr#][,Udv#]—SAVE to disk

HEADER "name"[,Iid#],Ddr#[,ON Udv#]—formats a disk, BASIC 2.0's NEW command

RENAME [,Ddr#]"old name" TO "new name"[,Udv#]—renames a disk file

SCRATCH "file name" [,Ddr#][,Udv#]—erases a disk file

Notes for DOS commands

dr# = drive number, i.e. 0 or 1
dv# = device number, i.e. 8 or 9
id# = two character disk id

Structured Programming

DO [UNTIL bool arg WHILE bool arg] program statements [EXIT]

LOOP [UNTIL bool arg WHILE bool arg]

IF bool arg THEN statement [:ELSE statement]

bool arg = logical expression which is either true or false (- 1 or 0)

Enhanced User Interface

GETKEY—same as 10 GET A$:IF A$ = ""THEN GOTO10

PRINT[#1fn] USING format list;print list;—formatted PRINT statement

PUDEF"1 to 4 characters"—redefines PRINT USING symbols

Compiled by Morton Kevelson

Graphics

BOX [c - s#],x1,y1,x2,y2,[[,angle][,paint]]—draws a rectangle

CHAR [c - s#],col,row[,text][,rvs - flag]—displays text on both the text and the graphic screens; equivalent to PRINT AT

CIRCLE [c - s#],[xc,yc],xr[,yr][,[sa][,ea][,angle][,inc]]]]]—draws a circle

COLOR c - s#,color#,[,luminance]—assigns colors to the five color sources

DRAW c - s#[,x1,y1[TOx2,y2...]]—draws dots, lines and shapes

GRAPHIC mode[,clear-option]/CLR—allocates or deallocates a ten kilobyte graphic area; sets up selected graphic mode

LOCATE x,y—places the pixel cursor on the screen

PAINT [c - s#][,[x,y][,fill-mode]]—fills an area with color

SCALE n—scales drawing coordinates from 0 to 1023

SCNCLR—clears the current screen

SSHAPE string - variable,x1,y1[,x2,y2]—saves a rectangular graphics screen area as a string

GSHAPE string - varsiable[,[a,b][,put - mode]]—displays a saved shape

Notes for graphics commands

c - s# = color source number
0 = background
1 = foreground
2 = multicolor 1
3 = multicolor 2
4 = border
mode = graphic display mode
0 = normal text screen
1 = high-resolution graphics screen
2 = high-resolution graphics, split screen
3 = multicolor graphics screen
4 = multicolor graphics, split screen
col = text column (0-39)
row = text row (0-24)
xr, yr = radii for circle
sa = start angle
ea = end angle

Reserved Variables

DS—reads current drive status from disk error channel

DS$—reads current drive error message

ER—last program error after a RUN

EL—line number for ER

Functions

DEC (hexadecimal string)—converts hexadecimal to decimal

ERR$(N)—returns program error message

HEX$(N)—converts decimal to hexadecimal

INSTR (string1,string2[start-position]—finds position of string 2 inside string1

JOY(n)—returns position of the joystick

RCLR(N)—returns color assignment

RDOT(N)—returns current position of the pixel cursor

RGR(X)—returns current graphic mode

RLUM(X)—returns luminance level of specified color source

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is especially true for programs which make use of the C-64's unique sound and graphics capabilities.

Programs written in BASIC 2.0 should fare much better, especially if they avoid any system-specific PEEKs and POKEs. In the latter case, C-64 BASIC programs should RUN with little or no modification.

The Plus/4 retains the Kernal, the jumbo jump table at the top of memory, which allows uniform access to all major I/O routines for all Commodore computers. As a result, properly written commercial software will be readily converted to the new machine.

BUILT-IN SOFTWARE

Four applications programs are included in the built-in ROM. These consist of a word processor, a spreadsheet, a database manager, and a chart graphics utility. These programs are intended to give the new user immediate access to some useful computer applications without having to learn either programming or very much about machine operations. Entry into the program is via the word processor. Simply hitting the f1 function key, followed by a RETURN, gets you started.

The nice thing about these programs is the way they easily interact with each other. Sections of the spreadsheet can easily be transferred to the word processor for editing and printing. The graphics program produces a pictorial display of spreadsheet rows or columns. The resulting chart can be merged into the word processor for editing and printing.

We will not present a full review of the built-in software at this time. The overall performance of the programs did not achieve the level which is currently available in the better software for the C-64. For example, the word processor is limited to 99 lines by 77 columns of text at one time. The small size of the text buffer is compensated for by the inclusion of linkfile capability.

We found text entry to be somewhat awkward. The editing screen is a 37 column by 22 line window which scrolls across a 77 line display. There was no way to either change this or to view the text in its final form.

The shortcomings of the word processor have already been recognized by Commodore. *Script/Plus*, an enhanced version of *Easy Script*, has already been released. We will report on this program in the near future.

DOCUMENTATION

The documentation is up to Commodore's usual standards, with some improvements. Advanced users will find many questions have been left unanswered. Most notable is a lack of information on the advanced bank switching supported by the Plus/4.

Two manuals are supplied with the computer. The User's Manual deals with the computer itself. The more than 200 pages are equally divided between a beginner's introduction and a reference section.

The applications programs are fully described in the 230-page *Integrated Software Manual*. Each program is independently described with a detailed tutorial followed by a reference section.

CONCLUSION

The Plus/4 offers more features for less money than any other machine on the market. The extended BASIC is Commodore's best effort to date. The programming commands and the built-in monitor make the Plus/4 a good programmer's machine. However, additional technical details on the machine's internal architecture will have to be released before it will achieve its full potential.

The built-in software is apparently intended to be the prime selling factor for this machine. These represent an effort to attract the first time users who would not otherwise conceive of a need for a home computer. While these programs are far from ideal, they will be adequate for many applications. More advanced users will find a need to move up to more sophisticated packages as they become available.

The ultimate success of the Plus/4 will probably be directly related to Commodore's own promotional efforts in making the general public aware of its capabilities. ☐

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